

CALIFORNIA INSTITUTE OF TECHNOLOGY

Division of the Humanities and Social Sciences
Pasadena, California 91125

THE PHYSICS, MATHEMATICS, AND CHEMICAL COMMUNITIES IN AMERICA, 1870-1915

A STATISTICAL SURVEY

Daniel J. Kevles and Carolyn Harding

Social Science Working Paper

Number 136

March 1977

This report aims to supplement the completed and ongoing efforts of recent years to gather statistics for the history of American science. Specifically, by surveying the physics, mathematics, and chemistry communities, we have sought to help fill in the statistical gap left between the studies of American science through the Civil War and the post-1920 compilations of the National Research Council.¹ To this end, we have addressed the following quantitative questions: How many people published research in physics, mathematics, and chemistry in the United States between the Civil War and World War I? What fraction of the publishers earned Ph.D.'s and what fraction did not? Where did they take their doctorates? How many studied abroad? Where were they employed? Where did they publish? What were their rates of publication? Who were the more productive members of each community? How did they differ from the total of publishers in the discipline at large? Who led the professional societies founded in each discipline? How did these organizational leaders compare with the productive people in their respective fields?²

To answer these questions, we compiled a list of everyone who published at least one article in physics, mathematics, or chemistry in the leading American journals for these fields during the period 1870-1915. Even though minor journals and governmental reports were neglected, we believe that the resulting list is reasonably comprehensive; no one has come to our attention who was not included but should have been. For physics, our search covered

the American Journal of Science, The Physical Review, the Proceedings of the American Academy of Arts and Sciences, and the Astrophysical Review (for articles in spectroscopy). For mathematics, we analyzed the American Journal of Mathematics, the Annals of Mathematics, and the Transactions of the American Mathematics Society. For chemistry, we examined the American Chemical Journal, the Journal of the American Chemical Society, and the Journal of Industrial and Engineering Chemistry. We then checked everyone who published at a rate of at least one article every three years for publications in foreign journals by consulting the Royal Society Catalogue of Scientific Papers, Poggendorff's Handbooks, and the bibliographies in the Biographical Memoirs of the National Academy of Sciences.

To present and analyze the resulting data, we divided the subject into two periods separated in the 1890s, when two of the disciplines acquired professional societies and the third developed a much stronger one, and when all three communities also began to expand at a rapid rate. The specific dividing point for physics was 1893, the inaugural year of The Physical Review. For mathematics it was 1890, about the time that the New York Mathematical Society became the American Mathematical Society. For chemistry, the year of division was 1892, when the American Chemical Society was reorganized into a genuinely national body. For the opening dates of the first period, we chose, in mathematics, 1878, when the American Journal of Mathematics was launched; in chemistry, 1879, which marked the first publication of the American Chemical Journal

and of the Journal of the American Chemical Society. The first period for both chemistry and mathematics was thus twelve years; the second, twenty-four. In physics the first and second periods were both twenty-four years long. In all, with appropriate adjustments for the anomaly of the first physics period, the data lend themselves to relatively easy comparative analysis.

For each period and discipline, we classified the publishers into two groups, productive and less productive. We arbitrarily took the definition of "productive" to be the publication of at least one article every three years. Since the second periods for each discipline were about equal, inclusion in the pantheon of productive mathematicians, physicists, and chemists after the 1890s required the publication of at least eight articles. Since the earlier periods were unequal, inclusion in the productive groups prior to the 1890s required the publication of at least four articles in mathematics and chemistry but of only seven in physics (to take account of presumably lower publishing rates in the earlier years). The productive publishers are listed in the accompanying Appendices I-VI.

For every publisher, productive or not, we tried to learn if, when, and where he or she received a Ph.D.; the principal places of his or her employment; and whether he or she had studied abroad. The less productive chemists in the second period were too numerous to make such a search possible, so we conducted an assessment of a sample of every eighth name on the total list. The main sources for this information were the three editions of American Men of

Science from 1906 to 1921, the Dictionary of American Biography, and the National Cyclopedia of American Biography. These sources yielded the necessary information for a large majority of the physicists and mathematicians but not for the chemists, especially in the second period. Possibly many of these missing chemists were in industrial corporations or business firms; however, consulting a few business directories did not yield many more names.

In the appendices, an entry under "Foreign Study" means that the person took his or her doctorate in Europe, or studied there as a pre or post-doctoral student; or was born and substantially educated there. The principal place or places of employment covers the years after the receipt, or after the average age of receipt, of the doctorate and of course applies only to the period covered by the particular appendix. For publishers not found in one of the main sources, the principal place of employment was identified by the institutional affiliation which often appeared with the article. The "Productivity Rate" is simply the yearly average of articles published per person. For people who entered the profession after the beginning of a given period, the computation was made on the basis of the years since the person received the doctorate or reached 28, which was the average doctoral age for the three disciplines. In cases where computations were made for publishers with no doctoral or age information, the base was the entire period.

Practitioners of the three disciplines who entered upon research after the beginning of the period might well of course have

produced at the rate of one article every three years but not have achieved the total required for inclusion in the productive group in their discipline. It seemed important to identify these higher producers, but the task was not straightforward. A productivity rate of 0.33 would nominally place someone in the productive category, but a publisher could achieve even a far higher rate if in the last two years of the period he happened to publish one or two articles and also happened to be awarded his Ph.D. about the same time. To call such people productive would be spurious, since many of our mathematicians, chemists, and physicists published no more than one or two articles. To qualify as a productive practitioner, our scientists and mathematicians had to satisfy at least one of two criteria: first, they had to achieve an appropriate minimum productivity rate for at least six years; second, if the minimum rate was achieved in less than six years, they had to have published more than an appropriate minimum number of articles (in the cases of physics, mathematics, and chemistry in the later period, at least three; in the case of physics in the earlier period, at least three; in the case of chemistry and mathematics in the earlier periods, at least two).

To assess the leadership of the professional societies in physics, mathematics, and chemistry, we constructed a list for each society of the people who held any office in it, including council memberships. For the physics and mathematics societies, the lists covered the period from their respective foundings in 1899 and 1892;

for the chemical society, we constructed two lists, one for the period from 1876 to the reorganization in 1891, a second for 1892 to 1915. Officers who did not appear on the list of productive practitioners in their disciplines were checked for foreign publications, and this data was incorporated in their productivity rates. Some officers in each society did not show up among either the productive or less productive practitioners; if their biographical data could be found, it was taken into account, but we have no productivity rates for most of these people. The data from the professional society survey are presented in Appendices VII to X.

The overall results of this statistical survey are summarized in the accompanying Tables 1 through 16. While most of these tables are self-explanatory, we offer a few notes of explication. Percentage columns do not always add to 100 because the individual figures have been rounded off. The numbers in Table 9 refer to articles published in the listed journals. The figures in tables 11 and 12 refer to employment positions, i.e., positions held at the given institution by a productive practitioner for a reasonable time following the doctorate or average age of the doctorate. Since some individuals held more than one position during their careers, the numbers often add to more than the total of productive practitioners. The tabulations in Tables 14 and 15 are divided at 1897 because doctoral statistics by field and school have long been available for the years since 1898 but not for the preceding period.

Our principal purpose is to present this statistical data, but

a few summary observations might be in order.³

1) From Tables 1-4: In both periods and in all three disciplines, a relatively small fraction of the people publishing produced a disproportionately large fraction of the articles.

2) From Tables 1-4: All three disciplines grew substantially from the first to the second periods, but in each of them the growth of the productive group -- by factors of 1.83, 2.44, and 2.26 in physics, mathematics, and chemistry respectively -- was proportionately smaller than the growth -- by factors of 2.95, 4.12, and 6.78 -- of the disciplines themselves. The disproportion was more marked in chemistry possibly because so many chemists worked for industrial laboratories and did not publish in open journals.

3) From Tables 1-4: In physics and mathematics, the percentage of articles published abroad rose from the first to the second period; in chemistry it declined slightly. From Tables 9 and 10: Productive physicists published primarily in English journals, notably the Philosophical Magazine, and secondarily in German journals. Productive mathematicians followed much the same pattern, though they published steadily in French and Italian journals, too. German journals drew the large majority of articles by productive chemists.

4) From Tables 1-4: In both periods and in all three fields, more of the productive than of the less productive publishers earned Ph.D.'s and studied abroad.

5) From Tables 1-4: From the first period to the second in all three fields, significantly more of the productive and less

productive publishers held doctorates.

6) From the appendices, not included here, of less productive practitioners, in all three fields and in both periods, the majority of people published one or two articles, usually about the time of their Ph.D.'s or master's degrees, then never published again.

7) From Tables 5-8: In the first period, the production of domestic doctorates in all three fields was concentrated in Harvard, Hopkins, and Yale for physics and mathematics, and in the same group plus Columbia for chemistry. In the second period, seven centers produced at least 5% each of the Ph.D.'s in physics and chemistry, eight schools the same in mathematics. The institutional share in Ph.D. training was not appreciably different for the productive practitioners in each of the disciplines.

8) From Tables 11-12: In both periods, physicists and mathematicians found their positions of employment primarily in the academic world and, save for mathematicians in the later period, secondarily in federal agencies. In both periods, productive physicists were in general evenly distributed in the academic world, except in the first period when there were slight concentrations at Harvard, Yale, and MIT and, in the second, at Harvard and Cornell. Mathematicians were heavily concentrated at Johns Hopkins in the first period, but, save for slight concentrations at Princeton, Chicago, Harvard, and Cornell, were rather evenly distributed in the second. In both periods, productive chemists were broadly distributed through the academic world, and the degree of distribution tended to increase

from the first period to the second. In both periods, chemists also found their principal positions of employment in the academic world, but in the second period a significantly large fraction of productive chemists were employed in federal agencies, agricultural experiment stations, and business or industry.

9) From Table 13: In the first period, the American Journal of Science, which was edited at Yale, showed no statistical favoritism to articles submitted by Yale faculty and/or graduate students, but marked statistical favoritism was shown by the American Chemical Journal and the American Journal of Mathematics for Ph.D.'s and/or faculty at Johns Hopkins, where both journals were edited. In the second period, the statistical bias in favor of Hopkins continued in the editing there of the journals in chemistry and mathematics, and similar statistical bias in favor of Cornell physics doctorates and/or faculty appeared in the editing there of The Physical Review. These cases of statistical favoritism suggest that the journals in question had a significant local, as well as national, character.

10) From Tables 14 and 15: The production rate of Ph.D.'s in physics, mathematics, and chemistry for American universities in the 30 years from 1867 to 1897 was very low, approximately two to three per year in each discipline for the entire academic community. In that period, about two thirds of physics and mathematics and about half of the chemical doctors took their Ph.D.'s in the United States. In the three disciplines, the chief European universities for doctoral training were Berlin, Göttingen, Heidelberg, and Leipzig.

After 1897, a much smaller number and a still smaller fraction of Americans in all three disciplines took their Ph.D.'s abroad.

From Table 16: Since the productivity rates for the officers of all three societies were lower than for those of the professions at large, it is possible that each officer corps consisted in the early years of two groups of practitioners: first, a professionally oriented group of productive researchers; second, a less productive group who probably came from the geographical locale of the society's headquarters. However, the lower productivity rates of the officer corps are possibly explicable in part by the likely fact that some of the officers in each society were lapsed publishers, who turned to society duties in their later professional years. This possibility is consistent with the fact that the productivity rates for officers who published in both periods represent the rates overall from the year of the Ph.D. or equivalent to 1915. (An exception to this was the group of officers of the American Chemical Society in the first period, for whom the productivity rates were calculated for that period only.)

From the beginning, the American Chemical Society officer corps included a significant industrial and business faction. In the American Mathematical Society, the research-oriented group among the officers was more of a concentrated academic elite than the officers in the Physical Society, who in turn were more that way than the chemists but considerably less so than the mathematicians. In all three societies, too, the officers seem to have been much more

likely to have taken Ph.D.'s and studied abroad than the several publishers in their respective disciplines.

FOOTNOTES

1. That space has been partly filled by John L. Heilbron, Paul Forman, and Spencer R. Weart, Physics circa 1900: Personnel, Funding, and Productivity of the Academic Establishment (vol. 5; Historical Studies in the Physical Sciences; Princeton, New Jersey: Princeton University Press, 1975), and there is essential statistical data in Daniel J. Kevles, The Physicists: The History of A Scientific Community in Modern America (New York: Knopf, forthcoming, 1977). The pre-Civil War studies include Sally Gregory Kohlstedt, The Formation of the American Scientific Community: The American Association for the Advancement of Science, 1848-1860 (Urbana: University of Illinois, 1976); Donald DeB. Beaver, "The American Scientific Community, 1800-1860: A Statistical-Historical Study" (Ph.D. thesis, Yale University, 1966); Clark Elliott, "The American Scientist, 1800-1863: His Origins, Career, and Interests" (Ph.D. thesis, Case Western University, 1970); George H. Daniels, American Science in the Age of Jackson (New York: Columbia University Press, 1968); and Robert V. Bruce, "A Statistical Profile of American Scientists, 1846-1876," in George H. Daniels, ed., Nineteenth-Century American Science (Evanston: Northwestern University Press,

1972). An important compendium of statistical information for its special subject is Margaret Rossiter, "Women Scientists in America before 1920," American Scientist, 62 (May-June 1974), 312-23. The current "Chemical Indicators" project under the direction of Arnold Thackray will include a variety of key statistical data for that discipline.

2. This survey supersedes Daniel J. Kevles, "The Physics, Mathematics, and Chemical Communities in the United States, 1870-1915: A Preliminary Statistical Report," California Institute of Technology, Social Science Working Paper No. 94, August 1975. The research for this survey was done with the financial support of the Division of Humanities and Social Sciences at Caltech and of NSF Grant GS-39675. We are grateful for this aid.

3. For a discussion covering the three disciplines in the United States from 1870 to 1915 and based largely on this statistical data, see Daniel J. Kevles, "Physics, Mathematics, and Chemistry in the United States, 1870-1915: A Comparative Institutional Analysis," California Institute of Technology, Social Science Working Paper No. 139, August 1976, to be published in the proceedings of a conference on institutions of learning in America sponsored by the American Academy of Arts and Sciences.

PRODUCTIVE PHYSICISTS, MATHEMATICIANS, AND CHEMISTS

TABLE 1
FIRST PERIOD

TABLE 2
SECOND PERIOD

	Physicists 1870 - 1893	Mathematicians 1878 - 1890	Chemists 1879 - 1891	Physicists 1894 - 1915	Mathematicians 1891 - 1915	Chemists 1892 - 1914
Total People	49	29	68	91	74	150
Total Articles	757	203	813	1098	1137	2884
Foreign Articles ^a	19 % (144)	19 % (39)	16 % (134)	34 % (372)	27 % (303)	14 % (403)
Average Productivity Rate ^b	1.02	0.90	1.03	1.12	1.13	1.33
Ph. D. 's ^c	37 % (18)	52 % (15)	46 % (31)	77 % (70)	93 % (69)	71 % (110)
Foreign Ph. D. 's ^d	33 % (6)	27 % (4)	55 % (17)	21 % (15)	32 % (22)	23 % (35)
Foreign Study ^e	27 % (14)	31 % (9)	51 % (35)	38 % (35)	46 % (34)	40 % (63)

LESS PRODUCTIVE PHYSICISTS, MATHEMATICIANS, AND CHEMISTS

TABLE 3
FIRST PERIOD

TABLE 4
SECOND PERIOD

	Physicists 1870 - 1893	Mathematicians 1878 - 1890	Chemists 1879 - 1891	Physicists 1894 - 1915	Mathematicians 1891 - 1915	Chemists 1892 - 1914
Total People	187	53	259	560	266	2064 ^e
Total Articles	142	69	373	813	480	3296
Average Productivity Rate ^b	0.15	0.17	0.21	0.20	0.18	0.15
Ph. D. 's ^c	21 % (40)	32 % (17)	18 % (47)	50 % (278)	66 % (176)	23 % (472)
Foreign Ph. D. 's ^d	45 % (18)	29 % (5)	40 % (19)	17 % (46)	11 % (19)	15 % (72)
Foreign Study ^e	16 % (29)	11 % (6)	15 % (38)	18 % (93)	20 % (54)	9 % (176)

^a as percentage of Total Articles

^b articles per person per year; rates of 1.00 or more are omitted from calculation if based on three years or less

^c as percentage of entire disciplinary group

^d as percentage of total Ph. D. 's

^e absolute figures in this column obtained by multiplying sample figures by 8

DISTRIBUTION OF DOMESTIC DOCTORATES:
PRODUCTIVE GROUPS

TABLE 5: FIRST PERIOD

TABLE 6: SECOND PERIOD

	Physicists 1870 - 1893		Mathematicians 1878 - 1890		Chemists 1879 - 1891		Physicists 1894 - 1915		Mathematicians 1891 - 1915		Chemists 1892 - 1915	
	<u>Total</u>	<u>%</u>	<u>Total</u>	<u>%</u>	<u>Total</u>	<u>%</u>	<u>Total</u>	<u>%</u>	<u>Total</u>	<u>%</u>	<u>Total</u>	<u>%</u>
Berkeley							1	(1)			1	(1)
Brown												
Bryn Mawr												
Chicago							4	(5)	16	(33)	5	(6)
Clark							2	(3)	2	(4)		
Columbia					2	(15)	4	(5)	1	(2)	9	(12)
Cornell			2	(18)			21	(28)	6	(13)	4	(5)
Harvard	1	(9)	1	(9)	3	(23)	16	(21)	6	(13)	9	(12)
Hopkins	4	(27)	5	(45)	3	(23)	8	(11)	6	(13)	21	(27)
Illinois							2	(3)			1	(1)
Iowa							2	(3)				
Lafayette												
MIT							1	(1)			3	(4)
Michigan							3	(4)	1	(2)	3	(4)
Minnesota							2	(3)			1	(1)
Missouri												
Nebraska												
NYU												
N. Carolina											1	(1)
Penn							1	(1)	1	(2)	6	(8)
Princeton			1	(9)			5	(7)	1	(2)	1	(1)
Stanford									1	(2)		
Wisconsin							1	(1)			2	(3)
Yale	5	(45)	1	(9)	3	(23)	3	(4)	3	(6)	8	(10)
Others ^a	2	(18)	1	(9)	2				4	(8)	2	(3)
Total	11		11		13		76		48		77	

^a Others are American, Boston, Catholic, Cincinnati, Colorado, Cumberland, Georgia, George Washington, Hillsdale, Illinois Wesleyan, Indiana, Marietta, McGill, Ohio State, Ohio Wesleyan, Omaha, Purdue, Stevens, Syracuse, Tulane, Washington and Jefferson, Virginia, Western Reserve, Unknown.

DISTRIBUTION OF DOMESTIC DOCTORATES:

TOTAL

TABLE 7: FIRST PERIOD

TABLE 8: SECOND PERIOD

	Physicists 1870 - 1893		Mathematicians 1878 - 1890		Chemists 1879 - 1891		Physicists 1894 - 1915		Mathematicians 1891 - 1915		Chemists 1892 - 1915	
	Total	%	Total	%	Total	%	Total	%	Total	%	Total	%
Berkeley					1	(2)	5	(2)	1		17	(4)
Brown							2	(1)				
Bryn Mawr							2	(1)	2	(1)		
Chicago							31	(10)	49	(24)	53	(11)
Clark							11	(4)	14	(7)	8	(2)
Columbia					4	(10)	23	(7)	11	(5)	51	(11)
Cornell	1	(3)	2	(9)			59	(19)	17	(8)	36	(8)
Harvard	5	(15)	1	(4)	5	(12)	27	(9)	20	(10)	57	(12)
Hopkins	12	(36)	10	(43)	15	(37)	47	(15)	29	(14)	69	(15)
Illinois							11	(4)	2	(1)	9	(2)
Iowa							2	(1)				
Lafayette					1	(2)			2	(1)		
MIT					1	(2)	2	(1)			11	(2)
Michigan	1	(3)			2	(5)	12	(4)	1		11	(2)
Minnesota							6	(2)			1	
Missouri					1	(2)					16	(3)
Nebraska									3	(1)		
NYU					1	(2)	2	(1)			8	(2)
N. Carolina					1	(2)					9	(2)
Penn							12	(4)	4	(2)	38	(8)
Princeton			2	(9)			19	(6)	10	(5)	9	(2)
Stanford							5	(2)	1			
Wisconsin							11	(4)	1		18	(4)
Yale	10	(30)	4	(17)	5	(12)	15	(5)	26	(13)	24	(5)
Others ^a	4	(12)	4	(17)	4	(10)	6	(2)	10	(5)	26	(6)
Total	33		23		41		310		203		471	

^a See note a, Tables 5 and 6.

TABLE 9
MAJOR JOURNALS OF FOREIGN PUBLICATION

Physicists				Mathematicians				Chemists			
1870-93		1894-14		1878-90		1891-15		1879-91		1892-14	
#	%	#	%	#	%	#	%	#	%	#	%
Ann. Physik	11 (8)	28 (9)		Astr. Nachr.	4 (10)	0		Ber. D. Chem. Ges.	73 (54)	115 (29)	
Astr. Nach.	12 (8)	0		Comptes Rendus	2 (5)	29 (10)		Comptes Rendus	10 (7)	1	
Brit. J. Photog.	17 (12)	0		Copernicus	2 (5)	0		J. Prakt. Chem.	24 (18)	34 (9)	
Comptes Rendus	16 (11)	10 (3)		Crelle J. Math.	3 (8)	1		Liebig's Ann. Chem.	1	24 (6)	
Nature	21 (15)	7 (2)		Jahr. Deutsch Math.	0	14 (5)		Ztschr. Anor. Chem.	0	69 (17)	
Phil. Mag.	39 (27)	162 (49)		London Math. Soc. Pro.	2 (5)	37 (12)		Ztschr. Physik. Chem.	0	81 (20)	
Physic. Ztschr.	0	52 (16)		Math. Ann.	3 (8)	41 (14)		Others ^c	26 (19)	76 (19)	
Others ^a	28 (19)	76 (23)		Mess. Math.	3 (8)	9 (3)					
				Nature	3 (8)	0					
				Palermo Cir. Mat.	5 (13)	24 (8)					
				Phil. Mag.	6 (15)	15 (5)					
				Quat. J.P.A. Math.	1 (2)	41 (14)					
				Others ^b	5 (13)	92 (30)					
Total				Total				Total			
144				39		303		134		400	

^a Others include Annales Chemis, Arch. Sci. Phys., Gen., Bohm. Ges. Wiss. Abhand., Brit. Assoc. Report, Cambridge Phil. Soc. Proc., Carl's Rep., Elect. Mag., Exner Rep. Phys., Himmel und Erde, Jahr. Drahtl. Teleg., Jahr. Radioakt. Elekt., Japan Univ. Mem., J. Physique, Il Nuovo Cimento, Kolloidztschr., Le Radium, Lond., Phys., Soc. Proc., London Roy. Inst. Proc., Lond. Roy. Soc. Proc., Lond. Roy. Soc. Trans., Meteor. Ztschr. Wien, Mon. Scient., Neues Jahr. Mineral., Oest. Meteor., Ges. Ztschr., Paris Soc. Phys. Sean., Photog. Mittheil., Quat. J.P.A. Math., Rev. Scien., Spectro. Ital. Mem., Verh., Phy. Ges., Ztschr Anorg. Chem., Ztschr. Elekt., Ztschr. Instrum., Ztschr. Phys. Chem., Ztschr. Wiss. Photog.

^b Others include Acta Math., Ann. Math. Brioschi, Archiv. Math. Phys., Bibl. Math., Coll. Sci. Mat. Loria, Bordeaux Soc. Sci., Brit. Assoc. Rep., Bruzelles Acad. Mem., Bull. Soc. Math. France, Cambridge Phil. Soc. Proc., Cambridge Phil. Soc. Trans., Edin. Math. Soc. Proc., Edin. Roy. Soc. Proc., Edin. Roy. Soc. Trans., Gior. Mat. Battag., Gött. Nachr., J. Reine Angew. Math., J. Math. Liouv., Lond. Phys. Soc. Proc., Manchester Lit. Phil. Soc., Mitt. Natur. Gesell., Monat. Math. Phys., Nouv. Ann. Math., Phys. Ztschr., Re. Mois, Rev. Inter. L'Enseign., Roma Lin. Rend., Tohoku Math. J., Torino Atti. Acad. Sci., Venezia Inst. Atti., Ztschr. Bauwes., Ztschr. Math. Phys., Zurich Vierteljahr.

^c Others include Ann. Phys., Archiv. Pharm., Arch. Sci. Phys. Nat., Brit. Assoc. Rep., Bull. Soc., Chim. Paris, Chem. Zeitung, Edin. Roy. Soc. Proc., Gazz. Chem. Ital., Jahr. Radioakt. Elekt., J. Chimie Phys., J. Physique, Landw. Vers. Stat., London Chem. Soc. J., Lond. Roy. Soc. Trans., Lond. Roy. Soc. Proc., Nature, Phil. Mag., Phys. Ztschr., Rev. Scien., Tokyo Coll. Sci. J., Ztschr. Anal. Chem., Ztschr. Ver. Rueben-Ind.

TABLE 10

MAJOR COUNTRIES OF FOREIGN PUBLICATION: PRODUCTIVE GROUPS

	FIRST PERIOD						SECOND PERIOD					
	Physicists 1870 - 1893		Mathematicians 1878 - 1890		Chemists 1879 - 1891		Physicists 1894 - 1914		Mathematicians 1891 - 1915		Chemists 1892 - 1914	
	<u>Total</u>	<u>%</u>	<u>Total</u>	<u>%</u>	<u>Total</u>	<u>%</u>	<u>Total</u>	<u>%</u>	<u>Total</u>	<u>%</u>	<u>Total</u>	<u>%</u>
Germany, Austria, Switzerland	37	(26)	11	(28)	109	(81)	132	(40)	85	(28)	357	(89)
England, Scotland, Ireland	82	(57)	19	(49)	10	(7)	186	(56)	123	(41)	26	(7)
France, Belgium	22	(15)	2	(5)	13	(10)	15	(4)	43	(14)	17	(4)
Italy	1		6	(15)	1		1		47	(16)		
Others ^a	2	(1)	1	(3)	1		0		5	(2)	0	
Total	144		39		134		334		303		400	

^a Others include Japan and Sweden.

DISTRIBUTION OF EMPLOYMENT

TABLE 11: FIRST PERIOD

Physicists 1870 - 1893	Mathematicians 1878 - 1890	Chemists 1879 - 1891
---------------------------	-------------------------------	-------------------------

Total %	Total %	Total %
------------	------------	------------

Amherst	1	(2)	
Arizona			
Armour			
Berkeley	1	(2)	2 (7)
Brown			
Bryn Mawr		1 (3)	
Carnegie Inst.			
Case	1	(2)	1 (1)
Cath. U.			
Chicago			1 (1)
Cincinnati		1 (3)	2 (3)
CCNY	1	(2)	3 (4)
Clark		2 (7)	
Columbia	2	(3)	1 (1)
Cornell	1	(2)	2 (3)
Dartmouth	1	(2)	
Georgia			
Ga. Tech.			
Geo. Wash.			
Goucher			
Harvard	5	(8)	5 (7)
Haverford			1 (1)
Hopkins	2	(3)	3 (4)
Idaho			
Illinois			1 (1)
Indiana			
Iowa State			
Kansas	2	(3)	
Knox			
Lafayette			1 (1)
Lehigh			

TABLE 12: SECOND PERIOD

Physicists 1894 - 1915	Mathematicians 1891 - 1915	Chemists 1892 - 1915
---------------------------	-------------------------------	-------------------------

Total %	Total %	Total %
------------	------------	------------

		1 (1)	
3 (2)	2 (2)	4 (2)	
1 (1)			
1 (1)	1 (1)	4 (2)	
2 (2)		1 (.5)	
		1 (.5)	
2 (2)	8 (8)	5 (2.4)	
3 (3)	1 (1)	2 (1)	
	1 (1)	2 (1)	
2 (2)		1 (.5)	
2 (2)	4 (4)	8 (4)	
8 (7)	6 (6)	4 (2)	
1 (1)	3 (3)		
		1 (.5)	
10 (8)	6 (6)	5 (2.4)	
1 (1)	2 (2)		
2 (2)	6 (6)	5 (2.4)	
1 (1)			
5 (4)	4 (4)	8 (4)	
2 (2)			
		1 (.5)	
1 (1)	1 (1)	2 (1)	
1 (1)			
1 (1)			

TABLE 11: FIRST PERIOD (continued)

	Physicists 1870 - 1893		Mathematicians 1878 - 1890		Chemists 1879 - 1891	
	Total	%	Total	%	Total	%
Maine						
MIT	3	(5)			2	(3)
Michigan			1	(3)	1	(1)
Minnesota						
Missouri	1	(2)			1	(1)
Mt. Holyoke						
Nebraska						
New Hampshire						
N.Y.U.	1	(2)				
N. Carolina					1	(1)
N. Dakota						
Northwestern			1	(3)		
Ohio State	1	(2)	1	(3)	1	(1)
Oklahoma						
Oregon						
Pennsylvania					1	(1)
Penn. State						
Pittsburgh						
Princeton	2	(3)	1	(3)	1	(1)
Purdue					2	(3)
Rice						
Rutgers					1	(1)
Smith						
Stanford						
Stevens	1	(2)			1	(1)
Syracuse						
Tennessee					2	(3)
Texas						
Tufts					2	(3)
Utah						
Vassar						
Virginia			2	(7)	2	(3)
U. Wash.						
Wash. U.	1	(2)			1	(1)
Wash. & Lee					1	(1)
Wellesley						
Wesleyan					1	(1)

TABLE 12: SECOND PERIOD (continued)

	Physicists 1894 - 1915		Mathematicians 1891 - 1915		Chemists 1892 - 1915	
	Total	%	Total	%	Total	%
	2	(1)	3	(3)	8	(4)
	5	(4)	2	(2)	6	(3)
	3	(3)			3	(1.4)
			2	(2)		
			1	(1)		
	1	(1)	1	(1)	2	(1)
	1	(1)			2	(1)
	2	(2)			2	(1)
					3	(1.4)
	5	(4)	4	(4)	2	(1)
					2	(1)
			3	(3)	3	(1.4)
			1	(1)		
	5	(4)			1	(.5)
			9	(9)		
			1	(1)		
	2	(2)	2	(2)	2	(1)
					1	(.5)
			1	(1)		
			2	(2)		
	1	(1)			1	(.5)
	1	(1)	1	(1)		
			1	(1)	1	(.5)
	1	(1)	2	(2)	2	(1)
					2	(1)
	1	(1)				
			2	(2)	2	(1)

TABLE 11: FIRST PERIOD (continued)

	Physicists 1870 - 1893		Mathematicians 1878 - 1890		Chemists 1879 - 1891	
	Total	%	Total	%	Total	%
W. Reserve	1	(2)			1	(1)
West Virginia						
Wisconsin						
Worcester	1	(2)			1	(1)
Yale	10	(17)	1	(3)	4	(6)
Observatories	4	(7)	1	(3)		
High Schools					1	(1)
Agricultural					2	(3)
Colleges						
Agricultural					2	(3)
Expt. Stns.						
Medical Colleges					2	(3)
& Hospitals						
Other Colleges	4	(7)	4	(13)	1	(1)
& Universities						
Rockefeller Inst.						
Smithsonian						
Coast Survey	1	(2)	3	(10)		
Geological	4	(7)	1	(3)	1	(1)
Survey						
Bureau of					1	(1)
Standards						
Bureau of Mines						
Agriculture					2	(3)
Department						
Weather Bureau						
Army	3	(5)				
Navy	2	(3)	1	(3)		
State & Local					2	(3)
Health Depts.						
Misc. State &						
Local Agencies						
Misc. Federal					1	(1)
Agencies						
Business and			1	(3)	4	(6)
Industry						
Independent	3	(5)	2	(7)		

Total

60

30

68

TABLE 12: SECOND PERIOD (continued)

	Physicists 1894 - 1915		Mathematicians 1891 - 1915		Chemists 1892 - 1915	
	Total	%	Total	%	Total	%
			1	(1)		
	1	(1)	1	(1)		
	3	(3)	3	(3)	4	(2)
	3	(3)				
	2	(2)	5	(5)	7	(3.5)
	1	(1)				
	1	(1)			1	(.5)
					1	(.5)
					16	(8)
					3	(1.4)
	18	(15)	6	(6)	21	(10)
					1	(.5)
					2	(1)
	3	(3)			3	(1.4)
	1	(1)			18	(9)
	1	(1)				
					2	(1)
					4	(2)
					9	(4)
	8	(7)	1	(1)	13	(6)
					3	(1.4)

208

TABLE 13

CONTRIBUTIONS TO JOURNALS BY LOCAL FACULTY OR DOCTORATES

Faculty and/or Ph.D.'s in Discipline					Contributions to Journal Edited at Local School		
	School		Number	% Prod. Total		Number Articles	% Prod. Total
First Period	Yale	Physics	11	22	Am. J. Sci.	114	21
	Hopkins	Chemistry	6	8	Am. Chem. J.	87	18
	Hopkins	Mathematics	11	37	Am. J. Math.	61	53
Second Period	Cornell	Physics	19	21	Phys. Rev.	208	35
	Hopkins	Chemistry	24	15	Am. Chem. J.	354	43
	Hopkins	Mathematics	8	11	Am. J. Math.	41	17

Table 14: Physics, Mathematics, and Chemistry

Doctorates Awarded in the United States

	Physics		Mathematics		Chemistry		Total	
	To 1897	1898-15	To 1897	1898-15	To 1897	1898-15	To 1897	1898-15
Berkeley	0	4	0	1	1	16	1	21
Brown	1	2	0	0	0	0	1	2
Bryn Mawr	0	2	0	2	0	0	0	4
Chicago	2	26	2	42	9	44	13	112
Clark	4	8	5	7	0	8	9	23
Columbia	2	19	3	8	10	41	15	68
Cornell	8	49	3	15	0	42	11	106
Harvard	6	17	4	15	22	39	32	71
Hopkins	25	32	16	19	27	61	68	112
Illinois	0	10	0	2	0	9	0	21
Iowa	0	2	0	0	0	0	0	2
Lafayette	0	0	0	0	0	1	0	1
MIT	0	2	0	0	1	11	1	13
Michigan	1	12	0	1	4	9	5	22
Minnesota	0	5	0	0	0	1	0	6
Missouri	0	0	0	0	1	16	1	16
Nebraska	0	0	0	2	0	0	0	2
NYU	0	2	0	0	0	9	0	11
North Carolina	0	0	0	0	2	8	2	8
Pennsylvania	0	12	0	3	1	38	1	53
Princeton	2	10	4	7	1	9	7	26
Stanford	0	5	0	1	0	0	0	6
Wisconsin	0	11	1	0	0	18	1	29
Yale	16	14	7	20	14	15	37	49
Others	6	8	11	4	8	24	25	36
Total	73	252	56	149	104	419	230	818

Table 15: Physics, Mathematics, and Chemistry

Doctorates Awarded Abroad

	Physics		Mathematics		Chemistry		Total	
	To 1897	1898-15	To 1897	1898-15	To 1897	1898-15	To 1897	1898-15
Berlin	13	8	3	0	7	1	23	9
Bonn	1	0	0	1	0	0	1	1
Bordeaux	0	1	0	1	0	0	0	2
Edinburgh	1	1	1	1	0	0	2	2
Erlangen	0	0	1	1	0	0	1	1
Freiburg	0	0	0	0	8	9	8	9
Giessen	0	1	0	0	1	0	1	1
Göttingen	6	6	10	8	30	2	45	16
Heidelberg	6	3	5	2	18	1	29	6
Leipzig	8	3	5	2	26	9	39	14
London	0	2	2	0	0	0	2	2
Marburg	1	6	0	0	0	0	1	6
Munich	0	3	0	1	9	0	9	4
Strasburg	3	0	0	2	0	0	3	2
Tubingen	1	0	0	0	3	0	4	0
Wurzburg	3	1	0	0	2	0	5	1
Zurich	0	1	0	1	9	1	9	3
Others	1	1	4	1	3	9	7	11
Total	44	38	31	21	116	32	189	91

Others include Basel, Berne, Cambridge, Christiana, Geneva, Jena, Pan's, St. Andrews (Scotland), St. Petersburg, Upsala, Vienna.

TABLE 16

CHARACTERISTICS OF PROFESSIONAL SOCIETY OFFICERS

	American Chemical Society 1879-1891		Productive Chemists 1879-1891	American Chemical Society 1892-1914		Productive Chemists 1892-1914	American Mathematical Society 1892-1915		Productive Mathematicians 1892-1915	American Physical Society 1899-1915		Productive Physicists 1894-1915
	Total	%		Total	%		Total	%		Total	%	
Officers Listed	61			166			91			40		
Officers with Information ^a	38			145			91			40		
Ph. D.'s	21	55.3	46 %	100	68.9	71 %	69	75.8	93 %	31	77.5	96 %
Foreign Ph. D.'s ^c	12	57.1	25 %	47	47.0	23 %	28	40.6	28 %	12	38.7	18 %
Foreign Study ^d	16	42.1	51 %	77	46.3	40 %	51	56.0	45 %	22	55	39 %
Average Productivity Rate ^e	0.75	—	1.03	0.55	—	1.32	0.71	—	1.13	0.72	—	1.12
Publishers ^{b, d}	37	60.5		121	72.9		66	72.5		37	92.5	
Employment Characteristics												
Total Positions	50			191			101			45		
Total Institutions	41	1.22		123	1.55 ^g		40	2.52 ^g		31	1.45 ^g	
High Claim Institutions ^f	0	0		11 (47)	24.6		10 (57)	56.5		1 (4)	9.9	
Positions in:												
-Academic Institutions	26	52	75 %	141	59.7	73 %	96	95.0	98 %	38	84.4	89 %
-Public	7	14		54	28.3		23	22.8		10	22.2	
-Private	19	38		60	31.4		73	72.3		28	62.2	
Ag. Exp't. Stns.			3 %	4	2.1	6 %						
Medical Institutions	2	4	3 %	9	4.7	2 %						
Federal Agencies	3	6	7 %	16	9.4	11 %	3	3.0	1 %	6	13.3	5 %
State and Local Agencies	3	6	3 %	4	2.1	1.0%						
Business and Industry	11	22	8 %	35	18.3	5 %	2	2.0	1 %	1	2.2	6 %
Independent	5	10		9	4.7	1 %						

^a Information was obtainable for some officers who did not publish in the journals surveyed.

^b Means listed in at least one of Appendices I - VI. For the case of the later chemists, those not listed were checked against the total group from which the sample was drawn and entered if found there.

^c Percentages as total of Ph. D.'s.

^d Percentages as total of group.

^e Calculated for professional career (see text).

^f Institutions with 4 or more positions. Numbers in parentheses are total positions held in these institutions. The percentages are of total positions.

^g Positions per institution.

APPENDIX I

PRODUCTIVE PHYSICISTS

1870 - 1893

<u>Name</u>	<u>Place</u>	<u>Year</u>	<u>Foreign Study</u>	<u>Principal Employment</u>	<u>AJS*</u>	<u>PAA*</u>	<u>Foreign Articles</u>	<u>Total</u>	<u>Productivity Rate</u>
Barus, C.	Wurzburg	79	X	USGS	26	5	24	55	3.93
Becker, G.F.	Heidelberg	69	X	USGS	12			12	0.50
Bell, Louis	Hopkins	88		Hopkins Fellow; Consulting Engineer	6			6	1.20
Bigelow, F.H.	No			Various Observatories	6			6	.46
Bostwick, A.E.	Yale	83		Yale; Montclair, N.J.	3			3	.30
Cross, Chas. R.	No			MIT		10	1	11	0.55
Dana, J.D.	No		X	Yale	8		2	10	.42
Draper, H.	No		X	CCNY; Various Observatories	11		1	12	1.00
Draper, J.W.	No			New York University	5		3	8	.67
Ferrel, W.	No			Kansas City, Missouri	7		6	13	.59
Franklin, W.S.	No			University of Kansas	4			4	2.00
Gibbs, J.W.	Yale	63	X	Yale	8			8	.33
Hall, E.H.	Hopkins	80		Harvard	7	4	4	15	1.15
Hallock, W.	Wurzburg	81	X	USGS	4		3	7	.58
Hastings, C.S.	Yale	73		Yale	7		1	8	.4
Hazen, H.A.	No			U.S. Army Signal Corps	7		5	12	.75
Holden, E.S.	No			Various Observatories; U.S. Navy	12		9	21	1.05
Hutchins, C.C.	No		X	Harvard		7.5		7.5	0.33
Jacques, W.	Hopkins	79		MIT	1	7	1	9	0.64
Kimball, A.L.	Hopkins	84		Worcester Institute of Industrial Science	4	1		5	.55
Langley, S.P.	No			Smithsonian; Allegheny Observatory	20		12	32	1.33
Lea, M.C.	No			Independent	18		19	37	1.54
LeConte, John	No			Berkeley	17		5	22	.96
Linebarger, C.E.	No		X	Student Abroad	4			4	4.00
Loomis, E.	No			Yale	21		1	22	1.1
McGee, W.J.	No			USGS	4			4	.33
Mayer, A.M.	No			Stevens Institute Tech.	41		3	44	1.83
Mendenhall, T.C.	No			U.S. Army Signal Corps; OSU; USCGS	10		2	12	.50
Michelson, A.A.	No		X	U.S. Navy; Case	11		7	18	.75
Morley, E.W.	No			Western Reserve	10			10	.42
Newton, H.A.	No			Yale	10			10	.42

*AJS: American Journal of Science*PAA: Proceedings of the American Academy of Arts
and Sciences

APPENDIX I

(continued)

<u>Name</u>	<u>Place</u>	<u>Year</u>	<u>Foreign Study</u>	<u>Principal Employment</u>	<u>AJS</u>	<u>PAA</u>	<u>Foreign Articles</u>	<u>Total</u>	<u>Productivity Rate</u>
Nichols, E.L.	Gottingen	79	X	Cornell; Kansas	15		8	23	1.64
Nipher, F.E.	No			Washington University	13		3	16	.84
Norton, W.A.	No			Yale	14			14	.61
Peirce, B. O.	Leipzig	79	X	Harvard	2	5.5		7.5	0.54
Pickering, E.C.	No			Harvard; MIT	5		15	20	1.67
Pupin, M.I.	Berlin	89	X	Columbia	5			5	1.25
Rockwood, C.G.	Yale	66		Bowdoin, Princeton	12			12	.50
Rood, O.N.	No			Columbia	24		1	25	1.04
Rowland, H.A.	No		X	Hopkins	17	3	12	32	1.77
Shepard, C.U.	No			Amherst	6			6	.38
Sherman, O.Y.	Unlikely			Yale	9			9	.75
Silliman, B.	No			Yale	5			5	.33
Smith, J.L.	No		X	Independent	17		10	27	2.08
Stevens, W. Lec.	Georgia	82	X	Cooper Institute; Packer College Institute	14		2	16	1.45
Trowbridge, J.	Harvard	73		Harvard	29	18.5	1	48.5	2.43
Waldo, F.	Manrietta	89		U.S. Army Signal Corps	3			3	.38
Wright, A.W.	Yale	61	X	Yale	17			17	.71
Young, C.A.	No			Dartmouth; Princeton	22		4	26	1.08

APPENDIX II

PRODUCTIVE PHYSICISTS

1894 - 1915

<u>Name</u>	<u>Place</u>	<u>Year</u>	<u>Foreign Study</u>	<u>Principal Employment</u>	<u>Phys Rev.</u>	<u>Others</u>	<u>Domestic Articles</u>	<u>Foreign Articles</u>	<u>Total</u>	<u>Productivity Rate</u>
Adams, E.P.	Harvard	04		Princeton	3	1	4	5	9	.82
Allen, S.J.	Hopkins	06		Cincinnati	8		8	1	9	1.29
Anderson, S.H.	Illinois	12		Occidental; Wash. (Seattle)	4		4		4	1.33
Ayres, H.D.	Cornell	13		Carnegie Inst.; B.F. Goodrich	3		3		3	1.50
Barnes, H.T.	McGill	00		McGill	5		5	6	11	.73
Barnes, J.	Hopkins	04		Bryn Mawr	1	5	6	2	8	.73
Barnett, S.J.	Cornell	98		Stanford; Tulane; OSU	9		9	8	17	1.00
Barus, C.	Wurzburg	79	X	Brown	13	14	27	28	55	2.50
Benton, J.R.	Göttingen	00	X	Florida	6	2	8	1	9	1.80
Bidwell, C.C.	Cornell	14		Cornell	3		3		3	3.00
Blake, F.C.	Columbia	05	X	OSU	6		6	2	8	.80
Bridgman, P.W.	Harvard	08		Harvard	6	13	19	2	21	3.00
Brown, F.C.	Princeton	08		Iowa	14		14	5	19	2.71
Carmichael, R.D.	Princeton	11		Indiana	3		3	1	4	1.00
Child, D.C.	Cornell	97	X	Colgate	21		21	3	24	1.33
Coblentz, W.W.	Cornell	03		Bureau Stds.	16		16	15	31	2.58
Compton, K.T.	Princeton	12		Reed; Princeton	5		5	3	8	2.67
Cooper, F.L.	Hopkins	07		Yale		3	3		3	.38
Davis, B.	Columbia	01	X	Columbia	6	2	8	3	11	.79
Davis, H. N.	Harvard	06			1	4	5		5	0.55
Dodge, H.L.	Iowa	14		Iowa	3		3		3	3.00
Dorsey, H.G.	Cornell	08		Western Elec; Natl. Cash Reg.	3		3		3	.43
Duane, W.	Berlin	97	X	Colo; Curie Lab; Harvard	5	1	6	19	25	1.39
Earhart, R.F.	Chicago	00		OSU	9		9		9	.60
Ewell, A.W.	Yale	99	X	Worcester	4	3	7	1	8	.50
Fisher, W.J.	Cornell	08	X	Cornell; New Hampshire	6		6		6	.86
Franklin, W.S.	Cornell	01		Lehigh	14		14		14	1.00
Gibbs, R.C.	Cornell	10		Cornell	3		3		3	.60
Goddard, R.H.	Clark	11		Worcester; Prince; Clark	3		3		3	.75
Goodwin, H.M.	Leipzig	94	X	MIT	10		10	1	11	1.00
Gray, A.W.	Berlin	04	X	Berkeley; Bur Stds.	4		4		4	.37

APPENDIX II

(continued)

<u>Name</u>	<u>Place</u>	<u>Year</u>	<u>Foreign Study</u>	<u>Principal Employment</u>	<u>Phys Rev.</u>	<u>Others</u>	<u>Domestic Articles</u>	<u>Foreign Articles</u>	<u>Total</u>	<u>Productivity Rate</u>
Gurney, L.E.	Chicago	06		Idaho	3		3		3	.33
Guthe, K.E.	Marburg	92	X	Iowa; Michigan	8		8	3	11	.52
Hall, E.H.	Hopkins	80		Harvard	7	6.5	13.5	1	14.5	.66
Hartman, L.W.	Penn	03	X	Utah; Nevada	5		5		5	.42
Henderson, W.D.	Michigan	06		Michigan	3		3		3	.33
Hennings, A.E.	Chicago	14		Univ. High Schl.; Chicago	3		3		3	3.00
Hudson, C.S.	Princeton	07		USDA	3		3		3	.43
Hulett, G.A.	Leipzig	98	X	Michigan; Princeton	9		9	1	10	.59
Humphreys, W.J.	Hopkins	97		US Weather Bur.	6	3	9	6	15	.83
Ingersoll, L.R.	Wisconsin	05		Wisconsin	5	1	6	2	8	.80
Ives, H.E.	Hopkins	08		NELA; United Gas Improvement Assoc.	11	1	12	8	20	2.86
Ives, J.E.	Clark	01		Cinn; Clark	6		6	10	16	1.14
King, A.S.	Calif.	03	X	Mt. Wilson Obs.		5	5		5	.41
Knipp, C.T.	Cornell	00	X	Indiana; Illinois	10		10		10	.67
Kovarik, A.F.	Minn.	09	X	Minn.	3		3	8	11	1.83
Kunz, J.	Zurich	02	X	Mich; Illinois	9		9	2	11	.85
Langmuir, I.	Göttingen	06	X	G.E.	5		5	6	11	1.22
Lewis, G. N.	Harvard	99	X	MIT; Berkeley	3	2	5	19.5	24.5	1.44
Longdan, A.C.	Columbia	00		Knox	4	1	5		5	.33
Lyman, T.	Harvard	00		Harvard	2	8	10	3	13	.87
McDowell, L.	Cornell	09		Wellesley	4		4		4	.67
Magie, W.F.	Berlin	85	X	Princeton	8		8	3	11	.50
Merritt E.	No		X	Cornell	18		18	1	19	.86
Millikan, R. A.	Columbia	95	X	Chicago	13		13	8	21	1.00
Moore, B.E.	Göttingen	07	X	Nebraska	6	3	9	2	11	1.36
Morse, H. W.	Leipzig	02	X	Harvard	1	3.5	4.5	1	5.5	0.42
Moss, S.A.	Cornell	03		G.E.	5		5		5	.41
Nasmyth, G.N.	Cornell	10		Cornell	4		4		4	.80
Nichols, E.L.	Göttingen	79	X	Kansas; Cornell	26	1	27	7	34	1.61
Nichols, E.F.	Cornell	97		Colgate; Dartmouth; Columbia	10		10	4	14	.78
Nutting, P.E.	Cornell	03	X	Bur Stds; Eastman Kodak	8	3	11	4	15	1.25
Peirce, B. O.	Harvard					24	24		24	1.09
Pfund, A.H.	Hopkins	06		Hopkins	5	1	6	5	11	1.33
Pierce, C.A.	Cornell	08		Cornell; Worcester	4		4		4	.57
Pierce, G.W.	Harvard	00	X	Harvard	10		10	3	13	.87
Richtmeyer, F.K.	Cornell	10		Cornell	4		4		4	.80
Rowland, H. A.	No			Hopkins		6	6	2	8	1.14
Sanford, F.	No		X	Stanford	14	1	15	3	18	.82
Sheard, C.	Princeton	12		OSU	3		3		3	1.00
Shedd, J.C.	Wisc.	99		Colo. Coll; Westminster Olivet	10		10		10	.63

APPENDIX II

(continued)

<u>Name</u>	<u>Place</u>	<u>Year</u>	<u>Foreign Study</u>	<u>Principal Employment</u>	<u>Phys Rev.</u>	<u>Others</u>	<u>Domestic Articles</u>	<u>Foreign Articles</u>	<u>Total</u>	<u>Productivity Rate</u>
Sieg, L.P.	Iowa	10		Iowa	6		6		6	1.20
Smith, A.W.	Harvard	06		Haverford; Wisc; OSU	8		8		8	.89
Stewart, G.W.	Cornell	01		North Dakota; Iowa	11	1	12	2	14	1.00
Taylor, A.H.	Göttingen	09	X	Wisc; N. Dakota	13		13		13	2.17
Taylor, T.S.	Yale	09		Yale; Illinois		3	3	3	6	1.00
Tolman, R.C.	MIT	10	X	Cinn; Berkeley	5		5	6	11	2.20
Trowbridge, A.	Berlin	97	X	Princeton	7		7	10	17	.94
Trowbridge, J.				Harvard		7	7	11	18	0.75
Waggener, C.W.	Cornell	09		W. Va.	5		5	1	6	1.00
Webster, D. L.	Harvard	13		Harvard	1	3	4	1	5	2.50
White, W.P.	Cornell	04		Carnegie Inst.	13		13	6	19	1.73
Wick, F.G.	Cornell	08		Simmons; Vassar	8		8		8	1.14
Williams, E.H.	Illinois	10		Illinois	4		4		4	.80
Williams, N.H.	Mich.	12		Michigan	3		3		3	1.00
Williams, S.R.	Columbia	06	X	Oberlin	9	3	12		12	1.33
Wood, R.W.	No		X	Hopkins	8	5	13	93	106	5.58
Woodrow, J.W.	Yale	13		Illinois; AT & T	4		4		4	2.00
Worthing, A.G.	Mich.	11		NELA	5		5		5	1.25
Zeleny, A.	Minn.	07	X	Minn.	8 1/2		9		9	1.21
Zeleny, J.	Minn.	06	X	Minn.	8 1/2		9	4	13	1.44

APPENDIX III

PRODUCTIVE MATHEMATICIANS

1878 - 1890

<u>Name</u>	<u>Place</u>	<u>Year</u>	<u>Foreign Study</u>	<u>Principal Employment</u>	<u>AJM*</u>	<u>ANN*</u>	<u>Domestic Articles</u>	<u>Foreign Articles</u>	<u>Total</u>	<u>Productivity Rate</u>
Bolza, O.	Göttingen	86	X	Hopkins; Clark	2		2	3	5	1.25
Cole, F.N.	Harvard	86	X	Michigan	3	1	4		4	1.00
Craig, T.	Hopkins	78		Hopkins	18		18	5	23	1.92
Daniels, A.L.	Princeton	86	X	Hopkins	3		3		3	.75
Durfee, W.P.	Hopkins	83		Hopkins, Berkeley; Hobert	3		3		3	.43
Echols, W.H.	No			Charlottesville, Va; Mining Engineer; Missouri School Mines		4	4		4	1.33
Eddy, H.T.	Cornell	70	X	Cincinnati	4		4	1	5	.42
Fields, J.C.	Hopkins	87	X	Hopkins	4		4		4	1.33
Fine, H.B.	Leipeiz	85	X	Princeton	3		3		3	.60
Franklin, F.	Hopkins	80		Hopkins	15	1	16		16	1.60
Harris, R.A.	Cornell	88		USCGS		2	2		2	2.00
Heal, Wm. E.	No			Marion, Indiana		4	4		4	
Hill, G.W.	No			Columbia	3	5	8	1	9	.75
Howe, H.A.	Boston	84		Denver; Colorado University Park Naval Academy (Annapolis, Maryland)		4	4		4	.67
Johnson, W.W.	No			OSU	8	5	13	6	19	1.58
Kummell, C.H.	No			Life Insurance Co's	7		7		7	.58
McClintock, E.	No		X	Cornell		2	2		2	.33
McMahon, J.R.	No			Hopkins	3	1	4		4	
Mitchell, O.H.	Yale	85		Yale; Nwern	3		3	1	4	.80
Moore, E.H.	No			United States Navy; Hopkins	4		4	11	15	1.25
Newcomb, S.	No			USCGS	6		6	2	8	.67
Pierce, C.S.	No			Hopkins	5		5	6	11	.92
Rowland, H.	No			Bryn Mawr	3		3		3	.60
Scott, C.A.	London	85	X	Cincinnati Observatory; University of Virginia	2	7	9	4	13	1.08
Stone, O.	No			Hopkins; Clark	10		10		10	.83
Story, W.E.	Leipzig	75	X	Berkeley; Hopkins	4		4		4	.40
Stringham, W.J.	Hopkins	80		University of Virginia		4		4	4	
Thornton, W.M.	No			USCGS; USGS			5	5	5	.45
Woodward, R.S.	No									

*AJN: American Journal of Mathematics

*ANN: Annals of Mathematics

APPENDIX IV

PRODUCTIVE MATHEMATICIANS

1891 - 1915

<u>Name</u>	<u>Place</u>	<u>Ph. D.</u> <u>Year</u>	<u>Foreign</u> <u>Study</u>	<u>Principal</u> <u>Employment</u>	<u>AJM</u>	<u>ANN.</u>	<u>TRANS.*</u>	<u>Domestic</u> <u>Articles</u>	<u>Foreign</u> <u>Articles</u>	<u>Total</u>	<u>Productivity</u> <u>Rate</u>
Bateman, H.	Hopkins	13	X	Bryn Mawr; Hopkins	4	2		6	28	34	34.00
Birkhoff, G.D.	Chicago	07		Princeton	13	4	9	26	4	30	4.29
Blichfeldt, H. F.	Leipzig	98	X	Stanford	2	2	12	16		16	1.00
Bliss, G. A.	Chicago	00	X	Chicago		5	11	16		16	1.07
Bocher, M.	Gottingen	91	X	Harvard	3	18	8	29	6	35	1.24
Bolza, O.	Gottingen	86	X	Chicago	7		6	13	18	31	1.46
Brown, E. W.	Cambridge	97	X	Haverford; Yale	3	2	5	10	29	39	2.17
Carmichael, R.D.	No			Princeton	5	7	2	14		14	1.75
Chessin, A.S.	St. Peters	89	X	Hopkins; Washington University	7	4	1	12	4	16	.64
Coble, A.B.	Hopkins	02		Hopkins	4		6	10		10	.77
Coolidge, J. L.	Bonn	04	X	Harvard		5	6	11	2	13	.93
Craig, I.	Hopkins	78		Hopkins	4						
Curtiss, D.R.	Harvard	03	X	Northwestern	1	2	2	5	2	6	.67
Dickson, L.E.	Chicago	96	X	Berkeley; Texas; Chicago	24	12	34	70	50	120	6.32
Dines, L.L.	Chicago	11		Arizona; Saskaschawan	1	2		3		3	.75
Dresden, A.	Chicago	09		Wisconsin		2	1	3		3	.50
Echols, W.H.	No			University of Virginia	2	13		15		15	.63
Eiseland, J.A.	Hopkins	98		Annapolis; West Virginia	7		2	9		9	.53
Eisenhart, L.P.	Hopkins	00		Princeton	12	1		13	7	20	1.33
Emch, A.	Kansas	95	X	Colorado; Switzerland	3	9	1	13	8	21	1.05
Engler, G.S.				Hopkins	3	2	4	9		9	
Evans, G.C.	Harvard	10	X	Rice	1		4	5	7	12	2.40
Fischer, C.A.	Chicago	12		Columbia	2	1		3		3	1.00
Fite, W. B.	Cornell	01		Cornell; Columbia		2	6	8		8	.57
Ford, W.B.	Harvard	05		Michigan	1	1	3	5		5	.50

*TRANS.: Transactions of the American Mathematical Society

APPENDIX IV

(continued)

<u>Name</u>	<u>Place</u>	<u>Ph. D.</u> <u>Year</u>	<u>Foreign</u> <u>Study</u>	<u>Principal</u> <u>Employment</u>	<u>AJM</u>	<u>ANN.</u>	<u>TRANS.</u>	<u>Domestic</u> <u>Articles</u>	<u>Foreign</u> <u>Articles</u>	<u>Total</u>	<u>Productivity</u> <u>Rate</u>
Glenn, O.E.	Penn	05		Penn		1	3	4		4	.40
Gronwall, T.H.	Upsala	98	X	Princeton		5	3	8	9	17	1.00
Hedrick, E.R.	Göttingen	01	X	Missouri		5	3	8		8	.57
Huntington, E.V.	Strasburg	01	X	Harvard		3	6	9	2	11	.79
Hurwitz, W.A.	Göttingen	10	X	Missouri; Cornell		3	1	4		4	.80
Hutchinson, J.I.	Chicago	96		Cornell	1	1	7	9		9	.47
Jackson, D.	Göttingen	11	X	Harvard			6	6	3	9	2.25
Kasner, E.	Columbia	97	X	Columbia	5	1	12	18	2	20	1.11
Lamond, J.K.	Yale	10		Wesleyan	1		2	3		3	.60
Lefschetz, S.	Clark	11		Nebraska; Kansas	2	2	1	5	1	6	1.50
Lehmer, D.N.	Chicago	00		Berkeley	3	5	1	9		9	.60
Lennes, N.J.	Chicago	07		Montana; MIT; Columbia	3	2	2	7		7	.88
Love, C.E.	Michigan	13		Michigan	1	1	1	3		3	1.50*
Lovett, E.O.	Leipzig	96	X	Princeton	8	5	1	14	10	24	1.26
	Virginia	95									
McClintock, E.	No		X	Life Insurance	6	1	1	8		8	.33
MacMillan, W.D.	Chicago	08		Chicago	3	2		5	2	7	1.00
Manning, W.A.	Stanford	04	X		3		7	10		10	.91
Maschke, H.	Göttingen	80	X	Univ. Chicago	4	1	3	8	6	14	.82
Mason, M.	Göttingen	03	X	Yale; Wisconsin		1	6	7	6	13	1.08
Metzler, W.H.	Clark	92		Syracuse	7	4	1	12	5	17	.74
Miller, G.A.	Cumberland	93	X	Stanford; Illinois	19	16	23	58	64	122	5.55
Mitchell, H.H.	Princeton	10		Yale; Penn	1		3	4		4	.80
Moore, C.L.E.	Cornell	04		MIT	2	3		5		5	.46
Moore, C.N.	Harvard	08		Cincinnati		1	4	5	3	8	1.14
Moore, E.H.	Yale	85	X	Chicago	3	4	7	14		14	.58
Moore, R.L.	Chicago	05		Princeton; Penn; Northwestern		2	4	6		6	.60
Moorgan, F.M.	Cornell	12		Dartmouth	1	2		3		3	1.00*

APPENDIX IV

(continued)

<u>Name</u>	<u>Place</u>	<u>Ph.D.</u> <u>Year</u>	<u>Foreign</u> <u>Study</u>	<u>Principal</u> <u>Employment</u>	<u>AJM</u>	<u>ANN.</u>	<u>TRANS.</u>	<u>Domestic</u> <u>Articles</u>	<u>Foreign</u> <u>Articles</u>	<u>Total</u>	<u>Productivity</u> <u>Rate</u>
Morley, F.	Cambridge	97	X	Hopkins	3	1	6	10	8	18	1.00
Moulton, F.R.	Chicago	99		Chicago	2	2	4	8	3	11	.69
Osgood, W.F.	Erlangen	90	X	Harvard	3	7	7	17	7	24	.96
Pell, A.J.	Chicago	10	X	Mt. Holyoke	1	2	3	6		6	1.20
Porter, M.B.	Harvard	97		Texas	1	7	1	9		9	.50
Ranum, A.	Chicago	06		Cornell	3		4	7	4	11	1.22
Roever, W.H.	Harvard	06		Washington (St. Louis)		1	3	4	1	5	.56
Rowe, J.E.	Hopkins	10		Haverford; Dartmouth; Penn State		1	3	4		4	.80
Saurel, P.	Bondeaux	00	X	CCNY		9		9	1	10	.67
Sharpe, F.R.	Cornell	07		Cornell	2	2	4	7	1	8	1.00
Shaw, J.B.	Purdue	93		Kenyon; Millikin; Illinois	4		5	9		9	.41
Sinclair, M.E.	Chicago	08		Oberlin		3		3		3	.42
Sisam, C.H.	Cornell	06		Illinois	6			6	1	7	.78
Snyder, V.	Gottingen	94	X	Cornell	17	2	6	25	1	26	1.24
VanVleck, E.B.	Gottingen	93	X	Wesleyan; Wisconsin	3	5	10	18		18	.82
Veblen, O.	Chicago	03		Princeton	2	2	9	13	2	15	1.25
Wedderburn, J.H.M.	Edinburgh	08	X	Princeton	1	5	2	8	7	15	2.14
White, H.S.	Gottingen	90	X	Northwestern; Vassar	3	4	5	12	2	14	.56
Witlemore, J.K.	No			Western Reserve; Harvard; Yale		7		7	2	9	.58
Wilczynsky, E.J.	Berlin	97	X	Chicago	6		18	24	5	29	1.61
Wilson, E.B.	Yale	01	X	Yale; MIT		9	3	12	6	18	1.29
Young, J.W.	Cornell	04		Illinois; Northwestern; Princeton; Dartmouth	2	1	4	7	2	9	.82

APPENDIX V

PRODUCTIVE CHEMISTS

1879 - 1891

<u>Name</u>	<u>Place</u>	<u>Year</u>	<u>Foreign Study</u>	<u>Principal Employment</u>	<u>ACJ*</u>	<u>JACS*</u>	<u>Domestic Articles</u>	<u>Foreign Articles</u>	<u>Total</u>	<u>Productivity Rate</u>
Atwater, W.O.		69	X	Wesleyan; Storrs Agn'c Stn.	11		11		11	.92
Austen, P.T.	Zunich	76	X	Rutgers	11		11		11	.92
Bachman, I.A.					4		4		4	.33
Booth, J.C.	No			U.S. Mint, (Philad.)		4	4		4	.44
Bourgougnon, A.				CCNY		6	6		6	.50
Breneman, A.A.	No			Cornell		10	10		10	.83
Brown, W.G.	No		X	Tennessee; Washington & Lee; Missouri	2		2	2	4	.20
Casamajor, P.			X			13	13		13	1.08
Chittenden, R.H.	Yale	80	X	Yale	14		14	1	15	1.36
Clarke, F.W.	No			Cinn; USGS	17	1	18		18	1.50
Classen, E.					4		4		4	.33
Comey, A.M.	Heidelberg	85	X	Harvard; Tufts	5		5	3	8	1.33
Comstock, W.J.	No		X	Sheffield Sci. Schl.	5		5	2	7	3.50
Crafts, J.M.	No		X	MIT	4		4	9	13	.33
Darton, J.H.	No					3	3		3	3.00
Doremus, C.A.	Heidelberg	73		Bellevue Hospital Medi- cal College; CCNY		6	6		6	.50
Drown, T.M.	M.D.		X	Lafayette; MIT	4		4		4	.33
Duggan, J.R.				Hopkins	4		4		4	.33
Dunnington, F.P.	No			U. Virginia	2	2	4		4	.33
Endemann, H.	Marburg	66	X	NYC Health Dept.		7	7		7	.58
Freer, D.C.	Munich	87	X	Michigan	6		6	2	8	2.00
Friedburg, L.H.	Göttingen	70	X	CCNY		11	11		11	.92
Gesler, J.F.	No			NY Mercantile Exchange; NY State Dept of Agric.		5	5		5	1.66
Gibbs, Wokott	No		X	Harvard	16		16	2	18	1.50
Gladding, Thos.	No			Stilwell & Gladding Chem. Lab; NYC	3	4	7		7	.70
Goessman, C.A.	Göttingen	52	X	Mass. Agric. College		5	5		5	.42
Gooch, F.A.	Harvard	77	X	Yale	4		4		4	.33
Greene, Wm. H.	M.D.			Central High Schl. (Philad.)	4	1	5	4	9	.42
Hill, H.B.	No		X	Harvard	12		12	13	25	1.00

*ACJ: American Chemical Journal*JACS: Journal of the American Chemical Society

APPENDIX V

(continued)

<u>Name</u>	<u>Place</u>	<u>Year</u>	<u>Foreign Study</u>	<u>Principal Employment</u>	<u>ACJ*</u>	<u>JSCS*</u>	<u>Domestic Articles</u>	<u>Foreign Articles</u>	<u>Total</u>	<u>Productivity Rate</u>
Hooker, S.C.	Munich	85	X	Industry	4		4	3	7	1.17
Jackson, C.L.	No		X	Harvard	29		29	8	37	2.42
Keiser, E.H.	Hopkins	84		Washington Univ.	12		12	1	13	1.86
Kinnicutt, L.P.	Harvard	82	X	Worcester	6		6		6	.66
Kuhara, M.					6		6	1	7	.50
Ladd, E.F.	No			North Dakota Agric. Coll.	4	1	5		5	1.25
Leeds, A.R.	Yes			Stevens Institute	1	53	54	9	63	4.50
McCaleb, J.F.					4		4		4	.33
McCay, L.W.	Princeton	83	X	Princeton	5		5	4	9	1.13
Mabery, C.F.	Harvard	81		Case	30		30		30	3.00
Mackintosh, J.B.					3	1	4		4	.33
Mallet, J.W.	Göttingen	52	X	U. Virginia	11	2	13	4	17	1.31
Maxwell, W.					7		7	1	8	.58
Menke, A.E.					6		6		6	.50
Michael, A.	No		X	Tufts	43		43	44	87	4.30
Mixter, W.G.	No		X	Sheffield Sci. Schl.	14		14		14	1.12
Morley, E.W.	No			Western Reserve	3	2	5		5	.42
Morse, H.N.	Göttingen	75	X	Hopkins	16		16		16	1.33
Mott, H.A.	Columbia	75		New York Med. Coll.		4	4		4	.44
Nef, J.U.	Munich	86	X	Chicago	6		6	2	8	1.60
Newbury, S.B.					7		7		7	.58
Norton, L.M.					9		9	3	12	.75
Norton, T.H.	Heidelberg	75	X	U. Cinn.	9		9		9	.75
Noyes, W.A.	Hopkins	82		Tenn; Rose; Bur Stds.	13		13		13	1.86
	Munich	89	X							
Omdorff, W.R.	Hopkins	07	X	Cornell	4		4		4	1.00
Osborne, T.B.	Yale	85		Conn. Agric. Exptl. Stn.	4		4		4	.66
Perkins, W.H.					4		4	2	6	
Pitkin, L.						8	8		8	.67
Remsen, I.	Göttingen	70	X	Hopkins	38		38	4	42	3.23
Richardson, C.	No			USDA	9		9	1	10	1.28
Schneider, E.A.					4		4	3	7	.33
Smith, E.F.	Göttingen	76	X	U. Penn	22		22	4	26	2.00
Stebbins, J.H.	Omaha	93		Industry		25	25		25	25.00
Venable, F.P.	Göttingen	81	X	North Carolina	2	4	6		6	.60
Volney, C.W.	Berlin	63	X	Manufacturer		4	4		4	.33
Walter, E.	Columbia	75		Columbia; NY Health Dept		9	9		9	.75
Warder, R.B.	No		X	Haverford; Purdue;						
				Harvard	6		6		6	.50
Weber, H.A.	Ohio State	79	X	Illinois; OSU		4	4		4	.33
Wiley, H.W.	Hanover	76		Purdue; USDA	8	3	11	2	13	1.00

APPENDIX VI

PRODUCTIVE CHEMISTS

1892 - 1914

<u>Name</u>	<u>Place</u>	<u>Ph.D.</u> <u>Year</u>	<u>Foreign</u> <u>Study</u>	<u>Principal</u> <u>Employment</u>	<u>ACJ</u>	<u>JACS</u>	<u>JIEC*</u>	<u>Domestic</u> <u>Articles</u>	<u>Foreign</u> <u>Articles</u>	<u>Total</u>	<u>Productivity</u> <u>Rate</u>
Alway, F.J.	Heidelberg	97	X	Nebraska; Wesleyan	15	4	4	23	2	25	1.47
Andrews, L.	Gottingen	82	X	Iowa State University; Mallinckrodt Chemical Works	2	12		14	1	15	.65
Auchy, G.	No			Industry		17	1	18		18	.78
Avery, S.	Heidelberg	96	X	Nebraska	3	10		13	2	15	1.20
Baskerville, C.	Berlin	93	X	North Carolina; CCNY		20	15	35	1	36	1.64
	North Carolina	94									
Baxter, G.P.	Harvard	99		Harvard	8	31		39	15	54	3.60
Beans, H.T.	Columbia	04				4		4		4	.40
Beeson, J.L.	Hopkins	93		Georgia Normal and Industrial College	8			8		8	.38
Benedict, S.	Yale	08		Cornell	2	6		8		8	1.33
Bigelow, W.D.	No			USDA; National University		10		10		10	.50
Bingham, E.C.	Hopkins	05		Richmond	9			9	5	14	1.56
Bogert, M.T.	No			Columbia		46		46		46	4.60
Bosworth, A.W.	No			New York Experimental Station		1	3	4		4	.57
Bradley, C.E.	No			Pacific University; Oregon; Oregon Experimental Station			4	4		4	.58
Bray, W.C.	Leipzig	05	X	MIT; Berkeley		12		12	3	15	1.67
Browne, A.W.	Cornell	03		Cornell		12		12		12	1.09
Browne, C.A.	Gottingen	01	X	Louisiana Sugar Experimental Station; Penn Experimental Station;		10	2	12		12	.92
				New York Sugar Trade Laboratory							
Byers, H.G.	Hopkins	99	X	Washington (Seattle)	1	8		9		9	.60
Cain, J.R.				Bureau of Standards		3	7	10		10	

*JIEC: Journal of Industrial & Engineering Chemistry

APPENDIX VI

(continued)

<u>Name</u>	<u>Place</u>	<u>Ph. D.</u> <u>Year</u>	<u>Foreign</u> <u>Study</u>	<u>Principal</u> <u>Employment</u>	<u>ACJ</u>	<u>JACS</u>	<u>JIEC</u>	<u>Domestic</u> <u>Articles</u>	<u>Foreign</u> <u>Articles</u>	<u>Total</u>	<u>Productivity</u> <u>Rate</u>
Cameron, F.K.	Hopkins	94		Bureau of Soils; USDA		12		12		12	.60
Campbell, E.D.	No			Michigan	6	19	4	29		29	1.38
Campbell, G.F.	Columbia	03	X	Columbia		11		11		11	
Campbell, Wm.	Yale	14		Yale; USDA		4		4		4	.36
Chernoff, L.H.				Harvard	5	5		5		5	5.00
Clarke, L.	No			Penn State Department of Agriculture		15		20		20	
Cochran, C.B.	Wisconsin	08		South Dakota	8	4	4	8		8	.35
Cook, A.N.	Wurzburg	92	X	Illinois	5	8		8		8	1.33
Curtiss, R.S.	Columbia	07		CCNY		9		13		13	.59
Curtmann, L.J.	Harvard	98	X	USDA; Institute of Industrial Research	8			9		9	1.29
Cushman, A.S.	Chicago	98	X	Washburn College; Kansas	3	7		8		8	.50
Dains, F.B.	Illinois	03		University of Illinois; Washington	3	19		10		10	.45
Dehn, Wm.M.				(Seattle)				22	1	23	2.09
Dennis, L.M.	No		X	Cornell		18	1	19	6	25	1.08
Derick, C.G.	MIT	10		Illinois		10		10		10	2.50
Dewey, F.P.	No			Mint Bureau		4	4	8		8	.35
Dox, A.W.	Yale	09		Iowa Experimental Station		5		5		5	1.00
Dudley, W.L.	Maryland			Vanderbilt University		11		11		11	.48
Dunlap, F.L.	Harvard; Yale	95, 96		Michigan; USDA; Consulting Chemist	10			10		10	.55
Falk, K.G.				Columbia; MIT; Roosevelt Hospital	1	22		23	2	25	
Foote, H.W.	Yale	98	X	Yale	14	12		26	1	27	1.69
Frankfurter, G.B.	Berlin	93	X	Minnesota	4	18	1	23		23	1.10
Franklin, E.C.	Hopkins	94	X	Kansas; Stanford	7	9		16	4	20	1.00
Fraps, G.S.	Hopkins	99		Texas College; Texas Experimental	8	6	5	19		19	1.27
				Station							
Frary, F.C.	Minnesota	12	X	Minnesota; Industry		2	2	4		4	2.00

APPENDIX VI

(continued)

<u>Name</u>	<u>Place</u>	<u>Ph. D.</u> <u>Year</u>	<u>Foreign</u> <u>Study</u>	<u>Principal</u> <u>Employment</u>	<u>ACJ</u>	<u>JACS</u>	<u>JIEC</u>	<u>Domestic</u> <u>Articles</u>	<u>Foreign</u> <u>Articles</u>	<u>Total</u>	<u>Productivity</u> <u>Rate</u>
Freer, P.C.	Munich	87	X	Michigan; Bur. Science; Phillipines	13			13	6	19	.83
Gamer, J.B.	Chicago	97		Wabash College		1		1		1	
Getman, F.H.	Hopkins	03		Bryn Mawr	10			10	3	13	1.18
Gibbs, H.D.	No			USDA		7		7		7	.50
Gill, A.H.	Leipzig	90	X	MIT		14	3	17	1	18	.78
Gladding, T.S.	No			New York Produce Exchange		11	2	13		13	.56
Goldbaum, J.S.	Penn	10		Industry (Fels & Co.)		4		4		4	1.00
Gomberg, M.	Michigan	94	X	Michigan	4	20		24	15	39	1.95
Gordin, H.M.	Berne	97	X	Northwestern		9		9	1	10	.59
Grindley, H.S.	Harvard	94		Illinois	8			8	1	9	.45
Hale, W.J.	Harvard	02	X	Michigan	8			8		8	.67
Hall, R.D.	Penn	04		Wisconsin; Westinghouse; Lamp Inc.		5		5		5	.50
Hand, W.F.	Columbia	03		Mississippi Agricultural College		4		4		4	.36
Handy, J.O.	No			Pittsburgh Testing Laboratory		4	4	8		8	.47
Harding, E.D.	Heidelberg	00	X	Minnesota		9	4	13		13	.93
Hart, E.B.	No		X	New York Agricultural Experimental Station; University of Wisconsin	1	8		9	1	10	.83
Hawk, P.B.	Columbia	03		Penn; Illinois; Jefferson Medical College		16		16		16	1.45
Haywood, J.K.				USDA		9		9		9	
Heath, G.L.	No			Industry		6	3	9		9	.45
Herty, C.H.	Hopkins	90	X	Georgia; North Carolina		6	5	11	1	12	.52
	Berlin	99									
	Zurich	00									
Hildebrand, J.H.	Penn	06	X	Penn; Berkeley		9	1	10		10	1.25
Hill, A.E.	Freiburg	03	X	NYU		6		6	2	8	.73
Hill, H.B.					15			15	4	19	1.58

APPENDIX VI

(continued)

Name	Place	<u>Ph. D.</u> Year	Foreign Study	Principal Employment	ACJ	JACS	JIEC	Domestic Articles	Foreign Articles	Total	Productivity Rate
Hillebrand, W.F.	Heidelberg	75	X	USGS; Bur. Studies	1	12	1	14		14	.61
Hillyer, H.W.	Hopkins	85		Wisconsin; General Chemical Company	8			8		8	.35
Hopkins, C.G.	Cornell	98	X	Illinois Experimental Station		6		6		6	.38
Horn, D.W.	Hopkins	00		Bryn Mawr; Consulting Chemist	11			11		11	.79
Howe, J.L.	Berlin	82	X	Washington & Lee		11		11		11	.48
	Gottingen	82									
Hudson, C.S.	Princeton	07		USDA		21	1	22		22	3.14
Jackson, C.L.	No		X	Harvard	64			64	9	73	3.17
Jacobson, C.A.	Hopkins	08	X	Nevada; Nevada Experimental Station	8			8		8	1.33
James, C.	No		X	New Hampshire College		31		31		31	5.17
Jamieson, G.S.	Yale	04		Yale	1	6	4	11	1	12	1.20
Johnson, T.B.	Yale	01		Yale	47	42		89		89	3.87
Johnston, J.	St. Andrews (Sco Mand)	08	X	Carnegie Institution		9	1	10	4	14	1.67
Jones, H.C.	Hopkins	.92	X	Hopkins	55			55	33	88	4.00
Jones, L.W.	Chicago	97		Chicago; Cincinnati	8			8		8	.47
Kastte, J.H.	Hopkins	88		Kentucky State; Virginia	43			43		43	1.87
Keiser, E.H.	Hopkins	84		Bryn Mawr; Washington (St. Louis)	17			17		17	.74
Kelley, W.P.	Berkeley	12		Berkeley; Hawaii Experimental Station		5	4	9		9	4.50
Kober, P.A.	No			Rockefeller Institution; Roosevelt Hospital		12		12		12	6.00
Kohler, E.P.	Hopkins	92		Bryn Mawr	30			30		30	1.36
Kraus, C.A.	MIT	08		MIT		10		10	2	12	1.67
Lachman, A.	Munich	95	X	Oregon	9			9	7	16	.84
Langmuir, I.	Gottingen	06	X	Stevens Institute; GE Company		9		9	6	15	1.13
Lathrop, E.C.	American	16		USDA; DuPont		5	1	6		6	6.00
Leach, A.E.				Massachusetts State Board of Health		8		8		8	

APPENDIX VI

(continued)

<u>Name</u>	<u>Place</u>	<u>Ph.D.</u> <u>Year</u>	<u>Foreign</u> <u>Study</u>	<u>Principal</u> <u>Employment</u>	<u>ACJ</u>	<u>JACS</u>	<u>JIEC</u>	<u>Domestic</u> <u>Articles</u>	<u>Foreign</u> <u>Articles</u>	<u>Total</u>	<u>Productivity</u> <u>Rate</u>
Lenher, V.	Penn	98		Wisconsin		35		35	1	36	2.19
Lewis, G.N.	Harvard	99	X	MIT; Berkeley		28		28	3	31	1.87
Linebarger, C.E.	No		X	Lake View High School (Chicago)	10	12		22	3	25	1.30
Locke, J.	Heidelberg	95	X	Sheffield Science School	10			10	1	11	.58
Long, J.H.	Tubingen	79	X	Northwestern		30		30		30	1.30
Lythgoe, H.C.	No			Massachusetts State Board of Health		6	6	12		12	1.50
McCoy, H.N.	Chicago	98		Chicago		10		10	7	17	1.06
McIlhiney, P.C.	Columbia	94		Columbia Department of Metallurgy; Independent		11	1	12		12	.60
Mabery, C.F.	Harvard	81		Case	12	11	3	26		26	1.13
Meade, R.K.	No			Industry		7	1	8		8	1.00
Menzies, A.W.C.	Chicago	10		Chicago		13		13	1	14	1.44
Metzger, F.J.	Columbia	02		Columbia		8	1	9		9	.92
Michael, A.	No		X	Tufts	17			17	95	112	4.87
Miller, E.H.	Columbia	94				12		12	1	13	.65
Morgan, J.L.R.	Leipzig	95	X	Columbia		29		29	10	39	2.05
Morse, H.N.	Gottingen	75	X	Hopkins	31			31	1	32	1.39
Norris, J.F.	Hopkins	95		MIT; Simmons	17			17	2	19	1.00
Norton, T.H.	Heidelberg	75	X	Cincinnati; U.S. Counsul		10		10		10	.43
Noyes, A.A.	Leipzig	90	X	MIT	4	31		35	20	55	2.39
Noyes, W.A.	Hopkins	82		Terre Haute	18	26		44		44	1.91
	Munich	89	X								
Orndorff, W.R.	Hopkins	87	X	Cornell	24			24	1	25	1.09
Osborne, T.B.	Yale	85		Connecticut Agricultural Experimental Station	3	28		31	8	39	1.70
Parr, S.W.	No		X	Illinois		11	7	18		18	.78
Parsons, C.L.	No			New Hampshire College; U.S. Bureau of Mines		16		16	3	19	1.00

APPENDIX VI

(continued)

Name	Place	Ph. D. Year	Foreign Study	Principal Employment	ACJ	JACS	JIEC	Domestic Articles	Foreign Articles	Total	Productivity Rate
Phillips, F. C.	Penn	94	X	Pittsburgh	10			10	1	11	.55
Prescott, A. B.	Md			Michigan	1	15		16		16	1.14
Rather, J. B.	No			Texas Agric. Stn.		2	3	5		5	5.00
Reid, E. E.	Hopkins	98		Baylor; Hopkins	12			12		12	.75
Remsen, I.	M.D. Colum. Gottingen	70	X	Hopkins	14			14	1	15	.65
Richards, T. W.	Harvard	88	X	Harvard	7	33		40	5	45	1.96
Richards, W. D.	No			Swift & Co.		6	3	9		9	.90
Rogers, A.	Penn	02		Pratt Inst., NY		4	1	5		5	.42
Rosanoff, M. A.	No		X	NYU; Clark		17		17	4	21	1.75
Scholes, S. R.	Yale	11		Industry (H. C. Fry Glass Co.)		2	2	4		4	1.00
Schreiner, O.	Wisconsin	02	X	Bureau Soils; USDA		13		13		13	1.08
Seidell, A.	Hopkins	03		USDA; USPH	2	7	1	10		10	.91
Sherman, H. C.	Columbia	97		Columbia		30	3			33	1.94
Shorey, E. C.	Queens (Canada)	96	X	Hawaii Sugar Co; USDA		15		15		15	.83
Smith, A.	Munich	89	X	U. Chicago; Columbia		8		8	28	36	1.57
Smith, E. F.	Gottingen	76	X	Penn	2	59		61	23	84	3.65
Smith, G. McP.	Freiburg	03	X	Illinois		10		10	8	18	1.64
Snell, J. F.	Cornell	98		MacDonald, Canada		3	4	7		7	.44
Stieglitz, J.	Berlin	89	X	Chicago	14	8		22	6	28	1.22
Stokes, H. N.	Hopkins	84	X	USGS; Bur. Stds.	11			11	2	13	.57
Tartar, H. V.	Michigan	14		Oregon Agric. Expt.		3	9	12		12	3.00
Thatcher, R. W.	Chicago No	20		Stn; Oregon Coll. Wash. Agric. State Exp. Stn; Washington State		7	1	8		8	.57
Tingle, J. B.	Munich	89	X	Lewis; Hopkins; McMaster	10			10		10	.43
Tolman, L. M.	No			USDA		10	3	13		13	1.18

APPENDIX VI

(continued)

<u>Name</u>	<u>Place</u>	<u>Ph.D.</u> <u>Year</u>	<u>Foreign</u> <u>Study</u>	<u>Principal</u> <u>Employment</u>	<u>ACJ</u>	<u>JACS</u>	<u>JIEC</u>	<u>Domestic</u> <u>Articles</u>	<u>Foreign</u> <u>Articles</u>	<u>Total</u>	<u>Productivity</u> <u>Rate</u>
Toney, H. A.				Harvard	6	12		18	5	23	
Tower, O. F.	Leipzig	95	X	Adelbert		10		10	4	14	.74
Turrentine, J. W.	Cornell	08		Wesleyan; USDA		8	6	14		14	2.53
Tuttle, J. B.	No			Bureau Standards		3		3		3	.75
Van Slyke, L. L.	Michigan	82		NY Exptl. Stn.	10	7	1	18		18	.78
Veitch, F. P.	No			Bureau Soils; USDA		10		10		10	.56
Venable, F. P.	Gottingen	81	X	North Carolina		14		14		14	.61
Walker, P. H.				USDA		6	3	9		9	
Washburn, E. W.	MIT	08		Illinois		9		9	7	16	2.67
Wells, H. L.	No			Yale	11			11		11	.48
Wheeler, H. L.				Yale	67	10		77	2	79	3.43
Wiley, H. W.	Hanover	76		USDA; George Washington		17		17	2	19	.83
Winton, A. L.	No			Conn. Agric. Expr. Stn.; USDA		9		9		9	.39
Woodman, A. G.	No			MIT		9	1	10		10	.77
Young, S. W.	No		X	Stanford		17		17		17	1.00

APPENDIX VII

OFFICERS OF THE AMERICAN PHYSICAL SOCIETY

1899 - 1915

<u>Name</u>	<u>Place</u>	<u>Ph.D.</u>	<u>Year</u>	<u>Foreign Study</u>	<u>Principal Employment</u>	<u>Productivity Rate</u>
Ames, J. S.	Hopkins		90	X	Hopkins	.20
Barnes, H. T.	McGill		00		McGill	.73
Barus, C.	Wurzburg		79	X	USGS; Brown	3.06
Brace, D. B.	Berlin		85	X	Nebraska	.40
Bumstead, H. A.	Yale		97		Yale	.39
Burgess, G. K.	Paris		01	X	Bureau of Standards	.86
Carhart, H. S.	No			X	Northwestern	.26
Cole, A. D.	No			X	OSU	.24
Crew, H.	Hopkins		87		Haverford	.25
Franklin, W. S.	Cornell		01		Lehigh	1.00
Guthe, K. E.	Marbury		92	X	Iowa; Michigan	.52
Hall, E. H.	Hopkins		80		Harvard	.84
Hallock, W.	Wurzburg		81	X	USGS	.29
Hastings, C. S.	Yale		73		Yale	.24
Humphreys, W. J.	Hopkins		97		U.S. Weather Bureau	.83
Kimball, A. L.	Hopkins		84		Worcester Institute of Industrial Science	.16
Lewis, E. P.	Hopkins		95	X	Berkeley	.30
Lyman, T.	Harvard		00		Harvard	.87
Magie, W. F.	Berlin		85	X	Princeton	.40
McLennan, J. C.	Toronto		00	X	Toronto	2.27
Mendenhall, C. E.	Hopkins		98		Wisconsin	.41
Merritt, E.	No			X	Cornell	.81

APPENDIX VII

(Continued)

<u>Name</u>	<u>Place</u>	<u>Ph.D.</u>	<u>Year</u>	<u>Foreign Study</u>	<u>Principal Employment</u>	<u>Productivity Rate</u>
Michelson, A. A.	No			X	Case	.49
Miller, D. C.	Princeton		90		Case	
Millikan, R. A.	Columbia		95	X	Chicago	1.00
Nichols, E. F.	Cornell		97		Colgate; Dartmouth; Columbia	.78
Nichols, E. L.	Goettingen		79	X	Kansas; Cornell	1.58
Nipher, F. E.	No				Washington University	.62
Pierce, B. O.	Leipzig		79	X	Harvard	.29
Pupin, M. I.	Berlin		89	X	Columbia	.19
Rosa, E. B.	Hopkins		91		Bureau of Standards	.58
Rowland, H. A.	No			X	Hopkins	1.48
Sabine, W. C.	No				Harvard	.04
Skinner, C. A.	Berlin		99	X	Nebraska	.56
Stewart, G. W.	Cornell		01		North Dakota; Iowa	1.00
Stratton, S. W.	No				Bureau of Standards	
Thomson, E.	No				Thomson-Houston; G. E.	
Trowbridge, A.	Berlin		97	X	Princeton	.94
Webster, A. G.	Berlin		90	X	Clark	.16
Zeleny, J.	Minnesota		06	X	Minnesota	1.44

Source: Bulletin of the American Physical Society, Series 2, 7 (April 1962), 5-9.

APPENDIX VIII

OFFICERS OF THE AMERICAN MATHEMATICAL SOCIETY

1888 - 1915

<u>Name</u>	<u>Place</u>	<u>Ph. D.</u> <u>Year</u>	<u>Foreign</u> <u>Study</u>	<u>Principal</u> <u>Employment</u>	<u>Productivity</u> <u>Rate</u>	<u>Chicago</u> <u>Section Officer</u>
Allardice, R. E.	No			Stanford	0.15	
Baker, A.	Lafayette	89		Brooklyn High School	0.08	
Beman, W. W.	No			Michigan		
Blichfeldt, H. E.	Leipzig	98	X	Stanford	1.00	
Bliss, G. A.	Chicago	00	X	Chicago	1.07	
Bocher, M.	Goettingen	91	X	Harvard	1.24	
Bolza, O.	Goettingen	86	X	Chicago	1.24	
Bouton, C. L.	Leipzig	98	X	Harvard	0.41	
Brown, E. W.	Cambridge	97	X	Haverford; Yale	2.17	
Cajori, F.	Tulane	94	X	Colorado College	0.33	
Coble, A. B.	Hopkins	02		Hopkins	0.77	
Cole, F. N.	Harvard	86	X	Michigan	0.59	
Coolidge, J. L.	Bonn	04	X	Harvard	0.93	
Craig, T.	Hopkins	78		Hopkins	1.32	
Curtiss, D. R.	Harvard	03	X	Northwestern	0.67	
Davis, E. W.	Hopkins	84		Nebraska	0.06	X
Dickson, L. E.	Chicago	96	X	Berkeley; Texas; Chicago	6.32	
Eisenhart, L. P.	Hopkins	00		Princeton	1.33	X
Ferry, F. C.	Clark	98		Williams	0.18	
Fields, J. C.	Hopkins	87	X	Toronto	0.64	
Fine, H. B.	Leipzig	85	X	Princeton	0.13	
Fiske, T. S.	Columbia	88		Columbia	0.15	

APPENDIX VIII

(Continued)

<u>Name</u>	<u>Place</u>	<u>Ph. D.</u> <u>Year</u>	<u>Foreign</u> <u>Study</u>	<u>Principal</u> <u>Employment</u>	<u>Productivity</u> <u>Rate</u>	<u>Chicago</u> <u>Section Officer</u>
Ford, W. B.	Harvard	05		Michigan	0.50	
Harkness, J.	No		X	Bryn Mawr; McGill		
Haskell, M. W.	Goettingen	89	X	Berkeley	0.12	
Haskins, C. N.	Harvard	01	X	MIT; Cornell		
Hoskins, L. M.	No			Stanford	0.08	
Hedrick, E. R.	Goettingen	01	X	Missouri	0.57	X
Hill, G. W.	No			Columbia	0.32	
Holgate, T. F.	Clark	93		Northwestern	0.14	
Huntington, E. V.	Strasburg	01	X	Harvard	0.79	
Hutchinson, J. I.	Chicago	96		Cornell	0.47	
Hyde, E. W.	No			Cincinnati	0.04	
Johnson, W. W.	No			Annapolis	0.46	
Kasner, E.	Columbia	97	X	Columbia	1.11	
Kellogg, O. D.	Goettingen	02	X	Princeton; Missouri	0.62	
Keyser, C. J.	Columbia	02		Columbia	0.23	
Ladue, P.	No			NYU		
Lovett, E. O.	Leipzig	96	X	Princeton	1.26	
MacLaurin, R. C.	No		X	Columbia		
Maschke, H.	Goettingen	80	X	Chicago	0.46	
Mason, M.	Goettingen	03	X	Yale; Wisconsin	1.08	
McClintock, E.	No		X	Life Insurance	0.31	
Merriman, M.	Yale	76		Lehigh	0.04	
Messenger, H. J.	Cornell	86	X (London)	Travelers Insurance Company		
Miller, G. A.	Cumberland	93	X	Stanford; Illinois	5.55	X
Moore, E. H.	Yale	85	X	Chicago	0.58	X
Morley, F.	No		X	Hopkins	0.72	

APPENDIX VIII

(Continued)

<u>Name</u>	<u>Place</u>	<u>Ph. D.</u> <u>Year</u>	<u>Foreign</u> <u>Study</u>	<u>Principal</u> <u>Employment</u>	<u>Productivity</u> <u>Rate</u>	<u>Chicago</u> <u>Section Officer</u>
Moulton, F. R.	Chicago	99		Chicago	0.69	
Murray, D. A.	Hopkins	93		NYU; Cornell		
Newcomb, S.	No			U. S. Navy; Hopkins	0.26	
Newton, H. A.				Yale		
Olds, G. D.	No			Amherst		
Oliver, J. E.	No			Cornell		
Osgood, W. F.	Erlangen	90	X	Harvard	0.71	
Peirce, B. O.	Leipzig	79	X	Harvard	0.11	
Phillips, A. W.	Yale	77		Yale		
Pierpont, J.	Vienna	94	X	Yale	0.38	
Porter, M. B.	Harvard	97		Texas	0.50	
Pupin, M. I.	Berlin	89	X	Columbia	0.04	
Rees, J. K.	Columbia	95		Columbia (Observatory)		
Rietz, H. L.	Cornell	02		Illinois	0.23	
Scott, C. A.	London	85	X	Bryn Mawr	0.40	
Smith, P. F.	Yale	91	X	Yale	0.29	
Stone, O.	No			Various Observatories; UVA	0.38	X
Story, W. E.	Leipzig	75	X	Clark	0.35	
Stringham, W. I.	Hopkins	80		Berkeley; Hopkins	0.35	
Taber, H.	Hopkins	88		Clark	0.44	
Tanner, J. H.	Goettingen	01	X	Cornell		
Townsend, E. J.	Goettingen	00	X	Illinois		X
Tyler, H. W.	Erlangen	89	X	MIT	0.04	
Van Amringe, J. H.	No			Columbia		
Van Vleck, E. B.	Boettingen	93	X	Wesleyan; Wisconsin	0.82	X
Van Vleck, J. M.	No			Wesleyan		

APPENDIX VIII

(Continued)

<u>Name</u>	<u>Place</u>	<u>Ph. D.</u>	<u>Year</u>	<u>Foreign Study</u>	<u>Principal Employment</u>	<u>Productivity Rate</u>	<u>Chicago Section Officer</u>
Veblen, O.	Chicago		03		Princeton	1.25	
Wait, L. A.	No				Cornell		
Webster, A. G.	Berlin		90	X	Clark	0.08	
Westlund, J.	Yale		98	X	Yale; Purdue		
White, H. S.	Goettingen		90	X	Northwestern; Vassar	0.56	
Wilczynski, E. J.	Berlin		97	X	Chicago	1.61	X
Wilson, E. B.	Yale		01	X	Yale; MIT	1.29	
Woodward, R. S.	No				USGS; Carnegie Institution	0.13	
Young, J. W.	Clark		92	X	Clark	0.82	
Ziwet, A.	No			X	Michigan	0.03	X

CHICAGO SECTION OFFICERS ONLY

Hall, A. G.	Leipzig		02	X	Michigan; Illinois		
Holgate, T. F.	Clark		93		Northwestern	0.14	
Myers, G. W.	Munich		96	X	Chicago		
Newson, H. B.	Ohio Wesleyan		91	X	Kansas	0.45	
Slaught, H. E.	Chicago		98		Chicago	0.12	
Waldo, C. A.	Syracuse		93	X	Purdue		
Weld, L. G.	No				Iowa		

* Means the Productivity Rate is the average for two periods.

** Means High Producer

Source: Raymond C. Archibald, A Semicentennial History of the American Mathematical Society, 1888-1938
(New York: American Mathematical Society, 1938).

APPENDIX IX

OFFICERS OF THE AMERICAN CHEMICAL SOCIETY

1879 - 1891

<u>Name</u>	<u>Place</u>	<u>Ph. D.</u>	<u>Year</u>	<u>Foreign Study</u>	<u>Principal Employment</u>	<u>Productivity Rate</u>
Alsberg, M.						
Appleton, J. H.	No			X	Brown	-
Barker, G. F.	M. D.				Penn	-
Behr, A.	Heidelberg		69	X	Industry	-
Booth, J. C.	No				U. S. Mint (Philadelphia)	.17
Breneman, A. A.	No				Cornell	.44
Caldwell, G. C.	Goettingen		57	X	Cornell	.83
Casamajor, P.	No			X		.08
Chandler, C. F.	Goettingen		56	X	Columbia	1.08
Doremus, C. A.	Heidelberg		73	X	CCNY; Bellevue Hospital Medical College	.08 .50
Elliott, A. H.					College Mines	
Endemann, H.	Marburg		66	X	New York City Health Department	.25
Friedburg, L. H.	Goettingen		70	X	CCNY	.58
Gallatin, A. H.						.92
Geisler, J. F.	No				New York Mercantile Exchange; New York State Department of Agriculture	1.66
Geyer, W. E.						
Gladding, T. S.	No					
Goessman, C. A.	Goettingen		52	X	Stilwell & Gladding Chemical Laboratory Massachusetts Agricultural College	.90 .42
Goldmark, J.						
Goldschmidt, A.						
Habirshaw, W. M.						
Hale, A. C.	Heidelberg		80	X	Brooklyn Boys' High School	
Hall, R. W.						

APPENDIX IX

(Continued)

<u>Name</u>	<u>Place</u>	<u>Ph. D.</u>	<u>Year</u>	<u>Foreign Study</u>	<u>Principal Employment</u>	<u>Productivity Rate</u>
Hallock, A. P.	Columbia		83		Industry	.13
Hart, E.	Hopkins		78		Lafayette	.25
Herreshoff, J. B. F.	No				Inventor; Herreshoff Mfg. Co.	
Hunt, T. S.	Yes				Geological Survey, Canada; MIT	
Johnson, S. W.	No				Yale	.25
Kent, W. H.						
King, F. T.						
Koenig, G. A.					Penn	.58
Ledoux, A. R.						
Leeds, A. R.	Yes				Stevens Institute	4.50
Liebschutz, M.						
Lupton, N. T.						
McKenna, C. F.	Columbia		94		Industry; Independent	
McMurtie, W.	Lafayette		75		USDA; NY Tartar Co.	
Mallet, J. W.	Goettingen		52	X	University of Virginia	1.08
Mason, W. P.	No			X	RPI	.20
Morton, H.					SIT	.58
Munroe, C. E.	Columbia		94		U. S. Navy; George Washington	2.00
Munsell, C. E.						
Nason, H. B.	Goettingen		57	X	RPI	
Nichols, W. H.						
O'Connor, T. D.						
Prescott, A. B.	M. D.				Michigan	.25
Prochazka, G. A.						
Rau, H. M.						
Remsen, I.	Goettingen		70	X	Hopkins	3.12
Ricketts, P. de P.	Unknown				Columbia; Independent	.08

APPENDIX IX

(Continued)

<u>Name</u>	<u>Place</u>	<u>Ph.D.</u>	<u>Year</u>	<u>Foreign Study</u>	<u>Principal Employment</u>	<u>Productivity Rate</u>
Rupp, Wm.						
Sabin, A. H.	No				Industry	.09
Schweitzer, P.	Goettingen		69	X	Missouri	
Sloane, T. O'C.	Columbia		72		Seton Hall; Independent	.16
Squibb, E. R.	M. D.				Squibb & Sons	
Stebbins, J. H., Jr.	Omaha		93		Industry	25.00
Stilwell, C. M.						
Waldstein, M. E.						
Waller, E.	Columbia		75		Columbia; NY Health Department	.75
Woodman, D.	Stevens		87	X	U. S. Electric Light Company; Consulting Chemist	.50
Wormley, T. G.	M. D.				Capitol University; Starling Medical College; Penn	.17

Source: "Proceedings" in Journal of the American Chemical Society.

APPENDIX X

OFFICERS OF THE AMERICAN CHEMICAL SOCIETY

1892 - 1915

<u>Name</u>	<u>Place</u>	<u>Ph. D.</u>	<u>Year</u>	<u>Foreign Study</u>	<u>Principal Employment</u>	<u>Productivity Rate</u>	<u>Local Councilor</u>
Adamson, G. P.	No				Industry		
Alden, J.	No				Industry		X
Allen, E. T.	Hopkins		92		USGS	0.09	
Alway, F. J.	Heidelberg		97	X	Nebraska; Wesleyan	1.47	
Andrews, L. W.	Goettingen		82	X	State University of Iowa; Mallinckrodt Chemical Works	0.64	
Appleton, J. H.	No			X	Brown		
Arbuckle, H. B.	Hopkins		98		Florida State; Hopkins; Agnes Scott College	0.06	X
Austen, P. T.	Zurich		76	X	Rutgers; Brooklyn Polytech; Independent	0.36	
Avery, S.	Heidelberg		96	X	Nebraska	1.20	X
Baekeland, L.	Ghent		84	X	Mfg. & Consulting Chemist; Research Chemist	0.16	
Bailey, E.H.S.	Ill. Wesleyan		83	X	Kansas	0.03	X
Bancroft, W. D.	Leipzig		92	X	Cornell	0.35	
Barker, G. F.	M.D.				Penn		
Barton, G. E.	No				Whitall Tatum Co.	0.27	X
Bartow, E.	Goettingen		95	X	Kansas; Illinois	0.37	
Baskerville, C.	Berlin		93	X	North Carolina; CCNY	1.68	
	North Carolina		94				
Bennett, A. A.	No				Iowa Wesleyan; Iowa State	0.09	

APPENDIX X

(Continued)

<u>Name</u>	<u>Place</u>	<u>Ph. D.</u> <u>Year</u>	<u>Foreign</u> <u>Study</u>	<u>Principal</u> <u>Employment</u>	<u>Productivity</u> <u>Rate</u>	<u>Local Councilor</u>
Bigelow, W. D.	No			USDA; National University	0.50	
Black, H. V.	Hopkins			Georgia Tech; Georgia		X
Bogert, M.	No			Columbia	4.60	X
Booth, W. M.	M. D.			Minnesota; Mayo Clinic	0.33	
Brady, W. P.	No			Purdue Experimental Station; Illinois Steel Company		
Breneman, A. A.	No			Cornell	0.33	
Browne, A. W.	Cornell	03		Cornell	1.09	
Bucher, J. E.	Hopkins	94		Brown	0.11	
Cady, H. P.	Kansas	03		Kansas	0.36	
Caldwell, G. C.	Goettingen	57	X	Cornell	0.02	
Cameron, F. K.	Hopkins	94		USDA	0.60	
Campbell, E. D.	No			Michigan	1.38	
Carveth, H. R.	Cornell	98		Cornell; Niagra Electrochem Co.		X
Catlin, C. A.						X
Chamberlain, J. S.	Hopkins	99		USDA; Massachusetts College	0.07	
	Berlin	09	X			
Chamot, E. M.	Buffalo	97	X	Cornell	0.29	
Chandler, C. F.	Goettingen	56	X	Columbia	0.03	
Clarke, F. W.	No			USGS	0.79	
Coates, C. E.	Freiberg	88	X	Louisiana; Audobon Sugar School	0.15	X
	Heidelberg	89	X			
	Hopkins	91				
Coblentz, V.	Berlin	91	X	Columbia; E. R. Squibb & Sons		X
	Wurzburg	95	X			
	Munich	97	X			
Converse, W. A.						X

APPENDIX X

(Continued)

<u>Name</u>	<u>Place</u>	<u>Ph. D.</u> <u>Year</u>	<u>Foreign</u> <u>Study</u>	<u>Principal</u> <u>Employment</u>	<u>Productivity</u> <u>Rate</u>	<u>Local Councilor</u>
Dennis, L. M.	No		X	Cornell	1.08	
Dodge, F. D.	Columbia	90	X	Dodge & Olcott Co. (N.J.)	0.16	X
Doremus, C. A.	Heidelberg	73	X	Bellevue Hospital Medical College; CCNY	0.24	
Drown, T. M.						
Dudley, C. B.	Yale	74		Penn R. R. Company	0.04	
Dudley, W. L.	M.D.			Vanderbilt	0.50	
Emerson, W. H.	Hopkins	86		Georgia Tech	0.07	
Evans, T.	Erlangen	86	X	Industries; Cincinnati	0.19	X
Fetterolf, D. W.	M.D.			Penn		
Fitzgerald, F.A.J.	No		X	Industries; Consulting Engineer		
Frankfurter, G. B.	Berlin	93	X	Minnesota	1.10	
Franklin, E. C.	Hopkins	94	X	Kansas; Stanford	1.00	
Friedburg, L. H.	Goettingen	70	X	CCNY	0.24	
Geisler, J. F.	No			NY Mercantile Exchange; NY State Department of Agriculture	0.17	
Goessman, C. A.	Goettingen	52	X	Massachusetts Agricultural College		
Gomberg, M.	Michigan	94	X	Michigan	1.95	X
Gooch, F. A.	Harvard	77	X	Yale	0.11	
Gould, R. A.	No			U.S. Navy Yard; USDA		X
Gudeman, E.	Columbia	90	X	Professional Chemist; Consulting Chemist	0.26	X
Hale, A. C.	Heidelberg	80	X			
Hall, R. W.						
Hallock, A. P.	Columbia	83		Industry	0.03	
Hart, E.	Hopkins	78		Lafayette	0.14	

APPENDIX X

(Continued)

<u>Name</u>	<u>Place</u>	<u>Ph. D.</u> <u>Year</u>	<u>Foreign</u> <u>Study</u>	<u>Principal</u> <u>Employment</u>	<u>Productivity</u> <u>Rate</u>	<u>Local Councilor</u>
Henderson, W. E.	Hopkins	97		Ohio State	0.12	X
Hendrixson, W. S.	Harvard	93		Grinnell	0.14	
Herreshoff, J. B. F.	No			Nichols Copper Company		X
Herty, C. H.	Hopkins	90		Georgia; North Carolina	0.52	
	Berlin	99	X			
	Zurich	00	X			
Higley, G. O.				Michigan		
Hillebrand, W. F.	Heidelberg	75	X	USGS; Bureau of Standards	0.35	X
Hulett, G. A.	Leipzig	98	X	Michigan; Princeton	0.38	
Hummel, J. A.	No			Minnesota Experimental Station	0.09	X
James, J. H.						
Jayne, H. W.					0.06	X
Johnson, F. C.						
Johnson, S. W.	No		X	Yale	0.09	
Jones, L. W.	Chicago	97	X	Chicago; Cincinnati	0.24	
Kahlenberg, L.	Leipzig	95	X	Wisconsin	0.65	
Kinnicutt, L. P.	Harvard	82	X	Worcester	0.24	
Lachman, A.	Munich	95	X	Oregon	0.84	
Leach, A. E.	No			Massachusetts State Board of Health		
Leeds, A. R.	Yes			Stevens Institute	1.78	
Leffman, H.	M. D.			Wagner Free Institute; Pennsylvania College of Dental Surgery; Women's Medical College, Pennsylvania		
Lengfeld, F.	Hopkins	88	X	Chicago; Independent	0.41	
Lenher, V.	Penn	98		Wisconsin	2.19	X
Little, A. D.	No			A. D. Little, Inc.		

APPENDIX X

(Continued)

<u>Name</u>	<u>Place</u>	<u>Ph. D.</u> <u>Year</u>	<u>Foreign</u> <u>Study</u>	<u>Principal</u> <u>Employment</u>	<u>Productivity</u> <u>Rate</u>	<u>Local Councilor</u>
Loeb, M.	Berlin	87	X	NYU	0.29	X
Long, J. H.	Tubingen	79	X	Northwestern	1.06	
Lord, R. C.						X
Love, E. G.						
Lyons, R. E.	Heidelberg	94	X	State Department Geological and Natural Resources; Indiana	0.17	
McCandless, J. M.						X
McKenna, C. F.	Columbia	94		Industry; Consulting Chemist	0.06	
McMurtie, W.	Lafayette	75		NY Tartar Company; Royal Baking Powder Company		
Mabery, C.	Harvard	81		Case	1.65	
Mallet, J. W.	Goettingen	52	X	Virginia	0.33	
Marshall, J. A.	Tubingen	82	X	Penn	0.09	X
	Christiana	86				
Mathews, J. A.	Columbia	98	X	Industry	0.31	
Maury, G. P.						
Meade, R. K.	No			Industry	1.00	X
Miller, E. H.	Columbia	94		Columbia		
Miller, W. L.	Munich	90	X	Toronto		
	Leipzig	92	X			
Mills, J. E.	North Carolina	01		North Carolina; South Carolina	0.15	
Moechel, J. R.						
Morley, E. W.	No			Western Reserve	0.25	
Munroe, C. E.	No			U.S. Navy; George Washington	0.20	
Newberry, W. B.						
Nicholson, H. H.	No		X	Nebraska	0.05	

APPENDIX X

(Continued)

<u>Name</u>	<u>Place</u>	<u>Ph.D.</u> <u>Year</u>	<u>Foreign</u> <u>Study</u>	<u>Principal</u> <u>Employment</u>	<u>Productivity</u> <u>Rate</u>	<u>Local Councilor</u>
Norris, J. F.	Hopkins	95		Simmons	0.15	
Norton, T. H.	Heidelberg	75	X	Cincinnati; U.S. Consul	0.48	
Noyes, A. A.	Leipzig	90	X	MIT	2.39	
Noyes, W. A.	Hopkins	82		Terre Haute	1.73	
	Munich	89	X			
Parker, T. J.						
Parr, S. W.	No		X	Illinois	0.83	
Parsons, C. L.	No			New Hampshire College; U.S. Bureau of Mines	1.11	
Pennock, J. D.	No			Solvay Process Co.	0.09	X
Perry, C. M.						
Phillips, F. C.	No			Western University of Pennsylvania	0.55	X
Prescott, A. B.	M.D.			Michigan	0.06	
Ransom, J. H.	Chicago	99		Purdue	0.07	X
Remsen, I.	Goettingen	70	X	Hopkins	1.27	
Richards, J. W.	Lehigh	93	X	Lehigh	0.28	
Richards, T. W.	Harvard	88	X	Harvard	1.74	
Rising, W. B.	Heidelberg	71	X	California	0.06	
Robbins, W. K.	No			Amoskeag Mills		X
Rockwood, E. W.	M.D.		X	Iowa		X
Sabin, A. H.	No			Industry	0.09	
Sadtler, S. P.	Goettingen	71	X	Penn; Philadelphia College of Pharmacy	0.13	
Sanger, C. R.	Harvard	84		U.S. Naval Academy; Harvard	0.14	X
Schaffer, C. R.						
Schieffelin, W. J.	Munich	89	X	Schieffelin & Co.	0.04	

APPENDIX X

(Continued)

<u>Name</u>	<u>Place</u>	<u>Ph. D.</u> <u>Year</u>	<u>Foreign</u> <u>Study</u>	<u>Principal</u> <u>Employment</u>	<u>Productivity</u> <u>Rate</u>	<u>Local Councilor</u>
Schlundt, H. .	Wisconsin	01	X	Missouri		X
Schweitzer, H.	Freiburg	84	X	New York City; Industry		X
Shimer, P. W.	Lafayette	99		Drown Chemical Laboratory	0.28	
Shinn, O. L.	Penn	96		Penn	0.17	
Smith, A.	Munich	84	X	Chicago; Columbia	1.38	
Smith, E. E.	Yale	91		Fordham; Independent	0.04	
Smith, E. F.	Goettingen	76	X	Penn	2.10	
Smith, W. E.						
Smith, W. R.	Chicago	94		Lewis Institute, Chicago	0.17	X
Snell, J. F.	Cornell	98		Cincinnati; Macdonald	0.44	
Springer, A.	Hadelberg	72	X	Alex Fries & Bros.	0.17	
Squibb, E. R.	M.D.			E. R. Squibb & Sons	0.08	
Stantial, F. G.						
Stebbins, J.H., Jr.	Omaha	93		Industry	1.32	
Stieglitz, J.	Berlin	89	X	Chicago	1.08	
Stillman, J. M.	Berkeley	85	X	Sugar Refining Companies	0.14	
Stokes, H. N.	Hopkins	84	X	USGS	0.52	X
Talbot, H. P.	Leipzig	90	X	MIT	0.22	
Thurnaker, G.						X
Tolamn, L. P.	No			USDA	1.18	
Tucker, W. G.	Union	82		Albany Medical College; Albany College of Pharmacy		X
Venable, F. P.	Goettingen	81	X	North Carolina	0.59	
	Berlin	89				
Voorhees, S. S.	No			Pennsylvania Railroad; U.S. Supervising Architechts Office; Bureau of Standards	0.05	
Waldbott, S.	Bern	89	X	Lloyd Bros.; Ohio Mechanical Institute	0.09	

APPENDIX X

(Continued)

<u>Name</u>	<u>Place</u>	<u>Ph. D.</u> <u>Year</u>	<u>Foreign</u> <u>Study</u>	<u>Principal</u> <u>Employment</u>	<u>Productivity</u> <u>Rate</u>	<u>Local Councilor</u>
Walker, W. H.	Goettingen	92	X	MIT	0.32	
Waller, E.	Columbia	75		Columbia; NY Health Department	0.25	
Walters, H. E.						
Weber, H. A.	OSU	79		OSU	0.28	
Wells, H. L.	No			Yale	0.33	
Wheeler, A. S.	Harvard	00		North Carolina	0.43	
	Berlin	10	X			
White, H. C.	Virginia	87		Georgia; Georgia Experimental Station		
Whitney, W. R.	Leipzig	94	X	MIT; G. E.	0.43	
Wiley, H. W.	Hanover	76		USDA; George Washington	0.82	
Williams, C. B.	No			North Carolina; North Carolina Experimental Station	0.33	
Withers, W. A.	No			North Carolina; North Carolina Experimental Station	0.08	X
Wood, E. S.	M. D.			Harvard Medical School; Massachusetts General Hospital		
Woodman, D.	Stevens	87		U. S. Electric Light Company; Consulting Chemist	0.19	
Young, S. W.	No		X	Stanford	1.00	X

Source: "Proceedings" in Journal of the American Chemical Society.